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CONTENTS.

An Asterisk (*) denotes an illustrated article.

OFFICIAL NOTICE—
Annual Meeting of the New England Association..... 33

OFFICIAL CIRCULAR—
Ohio Gas Light Association..... 33

EDITORIALS—
Annual Meeting Society of Gas Lighting..... 33
After a Famine We are Treated to a Feast..... 33

Fourteenth Annual Meeting of the American Gas Light Association—Official Report—Concluded from page 9..... 34

An Experiment with Limed Coal, by Walton Clark—Discussion—Comparisons on Cost of Gas, Electric Light and Oil, by E. Stein—Amendment to the Constitution—Some Suggestions on Paper Writing, by J. H. Armington—Discussion—Electric Lighting, by C. F. Spaulding—Discussion—The Question-Box—"How can the demand for tar be increased?"—Mr. Turner, on Earthquakes—Uniformity of Meter Connections—Proposed Formation of an Association for Pennsylvania—Votes of Thanks.

A Supplement to the Chapter on Practical Gas Making, by Fred. Egner..... 40

Lecture on Natural Gas..... 40

Naphtha as an Enricher, by A. S..... 41

The Gas Companies and the State..... 42

Experiments on Flame..... 42

Useful Hints for Steam Users..... 43

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 43

Personal—Gas Rates at Columbia, Pa.—Washington (Pa.) also in Line—The Finance Committee of Philadelphia City Council Says "No."—Named as Chief Engineer—Brother Egner and His Varying Emotions—Cheaper Gas for Kingston, Canada—Judge Moran Hands Down a Decision—A Burner Company—An Item from Lincoln, Ills.—Something from Ironton, Ohio—Change in Firm Name—At Rest—One Day's Sendout at Poughkeepsie, N. Y.—New Gas Company—Holder for the Long Branch (N. J.) Gas Company—Mr. Glenn, of Cincinnati, Ohio—Frisky Natural Gas—The Brooklyn (N. Y.) Electric Light Controllers—Going Ahead—Price of Gas at Brunswick, Ga.—Street Lighting at Bayonne, N. J.—To Abandon Water Gas—Gas Companies Bidding for What is Left—To Compel a Reduction—To Light Their Roadway—Proposal to Establish a Gas Works—Eaton's Experience—Address Changed—American Society of Civil Engineers—What Collector Magone Thinks of the Electric Light—To Build the Lowell (Mass.) Holder—Named as General Manager—Secretary Butterworth's List.

The Market for Gas Securities..... 46

[OFFICIAL NOTICE.]

Annual Meeting of the New England Association.

To the Members of the New England Association of Gas Engineers:—The Annual Meeting of this Association will be held at Young's Hotel, in Boston, Mass., on February 16 and 17, 1887. The meeting will be called to order at 10 o'clock on Wednesday morning, and it is hoped that there will be a large attendance at that time. Papers have been promised by the following members: C. J. R. Humphreys—"Some Thoughts on Purification by Oxide." A. M. Norton—"Effects of Reduction in the Price of Gas." C. F. Prichard—"Candle Power and Illumination." R. B. Taber—"Some Photometrical Experiments." It is confidently expected that, in the next issue of the JOURNAL, other papers will be announced. The coming meeting will, from the above papers and their authors alone, certainly be very interesting. Any member having some question which he would like answered, or some subject he would like discussed, if he will notify the Secretary, before February first, of his wishes, a copy of the same will be mailed immediately to each member, so that all may come prepared to take part in the discussion.

CHARLES H. NETTLETON, Sec'y.

[OFFICIAL CIRCULAR.]

Ohio Gas Light Association.

OFFICE OF SECRETARY, COLUMBUS, OHIO, Jan. 10, 1887.

To the Members of the Association:—Now that the busy holiday season is over, all members of this Association, and others who expect to become members or attend our sessions, will, it is hoped, have time to devote some thought to the forthcoming Third Annual Meeting, which will be held in Dayton, Ohio, commencing on the third Wednesday of March, 1887, and lasting two days.

Two requisites, which it is the object of this circular to help secure, are essential to a profitable meeting, viz: a good attendance, and a sufficient number of papers to be read and discussed. As a stimulus to a good attendance, and to add interest to the meeting, as well as to obtain the best views of the gas men of the State upon a vexed subject, the President of the Association offers a reward of $25 for the best, and $10 for the second best, paper upon the following subject, the only condition being that there shall be not less than three papers presented thereon: "How Shall We Get Rid of Naphthaline Crystals About the Works, and Still Maintain High Heats?"

Papers have already been promised upon the following subjects: "Gas and Electricity—Two Interests or One?" "Tar as an Enricher;" "Gas Commissions;" and "A Regenerative Furnace Adapted to a Small Works." The following subjects have also been proposed, and members and others are *urgently requested* to *volunteer* papers thereon, notifying the Secretary at once. [The list will be found at close of page 45.]

Let every gas man in the State not only make his arrangements to attend our Dayton meeting, but also, if not willing to present a paper, at least be prepared to participate in the discussion of the subjects named.

IRVIN BUTTERWORTH, Sec'y.

ANNUAL MEETING SOCIETY OF GAS LIGHTING.

At the last annual meeting of the Society the time of the sessions was chiefly absorbed in the transaction of routine business. The address of the President was devoted to an oral *resume* of the progress of the past year, and in congratulating the Society upon its sturdy adherence to the principles that caused its formation. The ballot for officers resulted in the re-election of those who served in the past twelvemonth. The assignment for papers to be read at the assemblies of 1887 resulted in the following allotment: *Jan.*—M. S. Greenough and J. R. Thomas; *Feb.*—C. J. R. Humphreys and F. A. Sabbaton; *March*—C. H. Nettleton and C. H. Coggshall; *April*—D. D. Flemming and O. E. Cushing; *May*—W. Farmer and Wm. Coombs; *June*—W. A. Stedman and W. Mooney; *Sept.*—A. M. Smith and F. C. Sherman; *Oct.*—A. Strecker and E. Vanderpool; *Nov.*—A. B. Slater and J. H. Armington. The annual banquet was heartily enjoyed, and it goes without saying that the Society of Gas Lighting is in thorough good shape to grapple with the happenings of the ensuing twelvemonth.

AFTER A FAMINE WE ARE TREATED TO A FEAST.

Possibly we may be forgiven for having, in the exuberance of feeling that resulted from such an hitherto unheard or unseen state of affairs, sought to epitomize, in the above headline, our exact state of mind when it came to pass that a most wonderful "conjunction" had occurred. To express it in

a slightly different way, and perhaps in a manner more easily understood, no wonder that surprise should be created when a leading technical paper—not devoted to the interests of the gas maker—comes out and editorially acknowledges, as the *Iron Age* folks acknowledged in a recent issue, that what was done and said at the late Philadelphia meeting, in respect of the paper on gas commissions there presented by Mr. Geo. G. Ramsdell, was in the nature of a revelation to its proprietors. The revelation, of course, being greatly to the credit of the gas men, in that the *Iron Age* apparently half confessedly admits that the previous history of gas companies in this country was anything but favorable to their proprietors. Leaving the *Iron Age* aside for the moment we come to the next and final (for the present at least) cause for surprise, which we find concealed or revealed in the message of that astute politician and remarkably successful leader of men, the Governor of the Empire State. Not that we find much that will positively commit Governor Hill to the support of a State Gas Commission in his allusions thereto in the document under consideration; but sufficient reason for wonder is afforded at the mere discovery that he should find it necessary to refer to the subject at all. Indeed the Governor may be fairly said to beg the question, but perhaps that is as far as a professional politician may safely go. Taking the Governor's gingerly way of handling the topic as evidence that he is inclined to pay some measure of attention to the abuses that the present capital amounts invested in gas undertakings in this State are subject to, we can assure him that our gas makers are not only inclined but ready to take him at his word. This is what he says: "It is suggested that the public demand for the correction of any abuses which may still exist, and which have not already been entirely remedied, may be met by the passage of a measure, not local in its character, but providing for the appointment of a State Commission, with power, under reasonable restrictions, to regulate and control the management of all gas companies throughout the State; to investigate all overcharges and other complaints; to report its investigations to the Legislature, and, in general, to possess over gas companies powers somewhat similar to those which the Railroad Commission of the State has over railroad companies; such commission to be maintained without cost to the State, but at the expense of the gas companies in a manner analogous to that in which the Insurance Department and the Railroad Commission are now supported." We accused the Governor of handling the subject gingerly, but the accusation could not have been urged did he employ the words, "I recommend," etc., instead of "It is suggested," etc. The "suggestions" are almost identical with those that have been urged by the gas makers of this and other States for at least twelve years back, and had they been acted upon in something like half-season, gas would now be selling in New York city at a less figure than that forced upon the companies by the legislation, unconstitutional and revengeful enough for the most reckless of its framers, of last spring. However, since the half of a loaf is better than no bread, perhaps the present session at Albany may witness a partial repair of the recklessness and savagery of the past. If Governor Hill is honest in what we may term his "present suggestions," and desires to help the gas consumers by protecting the gas manufacturers, we can assure him that the manufacturers will interpose no obstacle to the scheme "suggested." Assure them of the appointment of honest, incorruptible men to the commissionerships—and this can be best done by making their compensation sufficiently large—and the gas makers will be satisfied. Nevertheless, talk is cheap, and "suggestions" do not come at a high figure, either; furthermore, we cannot fail to remember that without the aid of Governor Hill the incongruous and punitory legislation before alluded to could never have attained true legal significance or import. And that legislation was incongruous, for instance, because it compelled the Central Company, which certainly does not supply over 2,000 consumers, to supply gas at a price equal to that paid to the Consolidated Company, by its thousands of customers; punitive, because the Companies of the metropolis would no longer submit to be blackmailed.

To come back to the *Iron Age* (the article therefrom appears in full elsewhere in our columns), we cannot, in the main, say much against the sentiments of its commentary. To the credit of its owners be it said, they have always shown a desire to be on the side of fairness and honesty in the agitation and discussion of questions that come within its province as the disseminator and upholder of knowledge at once truthful and exact. But we would remind our contemporary, having first thanked it for an outspoken opinion, that the consentient feeling on the subject of gas commissions on the part of the gas fraternity, displayed at the Philadelphia meeting of the American Gas Light Association, dates not from the occasion of that gathering. The feeling may have received sharp accentuation then, but it had been entertained and expressed many years ago, in proof whereof we submit in evidence the columns of this JOURNAL. Truly, though, between the *Iron Age's* comments and Governor Hill's message, we have cause for hope that those who were our enemies may yet become our allies. In the meantime it should be remembered that Massachusetts has a Gas Commission, while New York and her sister States are without such bodies.

[OFFICIAL REPORT.—Concluded from page 9.]

Fourteenth Annual Meeting of the American Gas Light Association.

HELD AT THE ACADEMY OF MUSIC, PHILA., PA., OCT. 20, 21, AND 22, 1886.

SECOND DAY—THURSDAY, OCT. 21—AFTERNOON SESSION.

The President introduced Mr. Walton Clark, of New Orleans, La., who read the following paper on

AN EXPERIMENT WITH LIMED COAL.

During the past season an opportunity for testing practically the effect of mixing lime with Pittsburgh coal before carbonization offered at the Jefferson City (La.) gas works. I availed myself of it, and for 25 days all the gas produced at the above works was from limed coal.

The experiment was expected to answer the following questions, relative to liming such coal as we use: What is the effect on the absolute amount of ammonia produced? On the sulphuretted hydrogen and carbonic acid in the crude gas? On the total sulphur in commercial gas? On purification, yield, and illuminating power?

The answers were apparently positive; and my desire is to present them with such details of the experiment as will enable each to judge of their value for himself.

One bench of retorts makes all the gas at our works in the summer months, and we have no plant for the manufacture of sulphate of ammonia. Purification is effected by means of Laming's mixture. The gas, leaving the hydraulic main, passes through 65 feet of 8-inch pipe to the exhauster, thence at once through a Pelouze & Audouin condenser and a vertical air condenser, of capacity sufficient to reduce the gas to atmospheric temperatures, and into the scrubber—a cylinder 20 ft. by 48 in., charged with coke. A set of four purifiers, having an area of 36 sq. ft. each, completes the producing and purifying plant. All the liquor and tar flow together to the tar tank. During the experiment a separator sent the tar to one tank and the liquor to another. As the liquor tank filled up the liquor was measured, sampled, and run to the drain.

Our first care was to so mix the coal and lime as to prevent loss in dust during charging. A few trials settled that point. The lime was slaked with its own weight of water and allowed to cool. Just before mixing with the coal 100 per cent. more water was added and the lime thrown over the coal, which was then turned once and loaded into the barrows. After 25 days' working there was no indication, away from the immediate vicinity of the lime box, that anything unusual had been going on. All the lime went into the retorts. Before charging, the limed coal was often thoroughly dried by the heat from the front of the bench. The coal was broken finer during the first ten days of the experiment than is usual with us. Afterward it was of the ordinary size. With coal broken very fine—almost slack—we obtained our best results in ammonia. I intended to use 3 per cent. of lime, but found at the end of the experiment that I had only used 2.7 per cent. This amount of pure calcic oxide is sufficient to fix as sulphide all the sulphur in the coal (1.13 per cent.), if the mixture were perfect and the conditions favorable.

With unlimed coal our total yield of ammonia per 2,240 lbs. was 5.3 lbs.—equal to 20.5 lbs. chemically pure sulphate, or 21.9 lbs. commercial (24 per cent.) salt.

With limed coal the yield was 7.4 lbs. ammonia, equal to 28.8 lbs. chemically pure sulphate—and increase of 8.3 lbs.

At the inlet of the scrubber the amount of sulphuretted hydrogen per 100 cu. ft. was—

With unlimed coal	384 grs.
With limed coal	247 grs.

At outlet of scrubber—

With unlimed coal	285 grs.
With limed coal	151 grs.

Carbonic acid at outlet of scrubbers per 100 cu. ft. of gas—

With unlimed coal	1,280 grs.
With limed coal	1,017 grs.

Total sulphur in commercial gas per 100 cu. ft.—

With unlimed coal	15.7 grs.
With limed coal	6.8 grs.

Carbonic oxide in commercial gas—

With unlimed coal	6.4 per cent.
With limed coal	5.0 per cent.

Two samples of pitch from stopped pipes contained no lime.

Limed coke shows numerous white specks from $\frac{1}{16}$ to $\frac{1}{4}$ in. in diameter, with an occasional white blotch an inch or more in diameter.

A purifier in use during the liming experiment purified 50 per cent. more gas per barrel of mixture than at any other time.

Three days after commencing the use of lime the firemen complained of the increase of clinker. This was more easily broken, and the labor of each clinkering operation somewhat reduced; but the increase in quantity was great, necessitating a shaking up of the fire each time the furnace was filled. The firemen were heartily glad when the use of lime ceased.

I was unable to discover any change in heats, yield, illuminating power, or amount of fuel used that could be charged to the lime. The ammonia determinations were made by means of the distillation test.

Discussion.

Mr. Helme—Did you use stone or shell lime?

Mr. Clark—I used a very fine quality of stone lime that comes from either Alabama or Tennessee. I never tried shell lime.

On motion of Mr. Stiness a vote of thanks was passed to Mr. Clark.

The next paper in order was that of Mr. E. Stein, of Philadelphia, Pa. The author being temporarily absent, President Wood instructed Secretary Humphreys to read the paper. In accordance with that instruction the Secretary read as follows:

COMPARISONS ON COST OF GAS, ELECTRIC LIGHT, AND OIL.

The great advances made during the past few years in the matter of devising and constructing appliances aimed to secure a more economical utilization of gas have surprised even those who were directly interested in procuring the desired result, and the general public, having viewed with gratification the measures put forward, is also disposed to admit that these measures have been successfully prosecuted. The inventors or workers in the direction of the improvement of gas burning appliances have the satisfaction, then, of knowing, aside from any practical pecuniary gain which may accrue to them, that the fruit of their industry is as acceptable and valuable to any one of the struggling millions as it is to the millionaire. Indeed, I do not think I am wrong in making the statement that the difference in the lighting result obtained from the gas consumed under the present advanced plan, in contrast with that gained under former ordinary conditions, is as great as that which existed between the tallow candle of past generations and the first gas flame with which it was compared.

Not only does the public appreciate the change effected by the advance, but is anxious to secure the practical results thereof, as is shown by the demand from it for a more profuse and higher power light than that which formerly satisfied its craving. The researches of the inventor, as shown by his results, have stimulated the people to seek a higher standard. Public taste, and also its necessities, actually demands a brilliant light to satisfy its present wants, and it is equally set in its provision that this increased illumination must be secured without any important addition to the cost of that granted under the old *regime*. That somewhat arbitrary demand means a higher candle power from a given quantity of gas consumed; and it has been the aim of the inventor to secure the seeming paradox.

It would be useless to assert that to the gas men alone should be given the credit of this revolution in public sentiment. The electrician has had a hand in it, and the kerosene oil burner adapter has also been an important agent for its development. In fact the advances made in the development and improvement in forms of kerosene oil burners must not be underrated. These have undoubtedly played a positive part in the premises, and have been instrumental in maintaining kerosene oil in the front rank of the gas manufacturers' lighting competitors. Gas, kerosene oil, and electricity are the three systems competing for the favor of the public in the matter of artificial illumination. Our gas works are established, and the majority of these are well equipped for the proper manufacture and distribution of an illuminating agent not attended with the difficulties or surrounded by the dangers which constantly accompany its rivals. Where gas can be obtained we have only to adopt and employ the best means available for its conversion into light, to at once show its superiority, both as to quality and cost, over other illuminants, and thus substantiate the claim that, while it is the light of the present, it is also to be the light of the future. Again, every forward step taken in the direction of a better utilization of gas has a double effect. It not only gives the consumer a better and cheaper light, and brings him into more cordial relations with the gas maker, but also insures to the latter a greater demand for his product.

Practical and scientific men have of late years devoted much research and study to the question of how best to secure a gain, or rather to develop the latent light-giving power of gas; and, step by step, the advance secured points to the fact that gas heads the list, in that it is the greatest light giver for all requirements in which the aid of artificial illumination must be called upon, and that prominence is achieved at a figure which makes its cost less than that of any of its rivals, all things considered. By the employment of improved gas burning appliances the brilliant effects of the most widely heralded incandescent electric systems are surpassed, and, at the same time, the brilliancy is obtained at an expense but equal to that which will be urged as an argument in favor of kerosene oil by the advocate of the latter. This being so, it is, therefore, largely to the interest of gas companies that their managers should bring to the notice of the public all the latest and most noted improvements in the matter of proper consumption of gas, and to facilitate or urge the introduction of those devices whose superiority has been demonstrated.

Remarkable progress in the development of the latent lighting power of gas has been made this year, and the achievement of the Lungren lamp, at the Novelties Exhibition of the Franklin Institute, Philadelphia, last October, may be regarded as giving substantial encouragement to the gas fraternity, for it proved that gas is capable of affording results sure to maintain it in the front rank as an illuminator. "Thirteen candle power per cubic foot of gas consumed" was the verdict given by the Committee on Lighting Tests appointed by the Franklin Institute. Their results were ascertained by measurements taken at an angle of 45°, and we find that the committee, referring to this fact, reported as follows:

"In measuring the light of the lamp (Lungren) the committee found it necessary to construct a photometer for the angular measurements. Horizontal measurements were made on the bar photometer used in testing the Siemens lamp. The flame of this lamp being entirely below the lamp, the horizontal rays do not represent its efficiency in actual use."

With such a result established, and the ability to maintain the same without increase in expense or the bestowal of frequent attention also placed beyond doubt, I am enabled to positively assert that illuminating gas can successfully compete with electricity or kerosene oil. In substantiation of the assertion, let me present the following comparisons:

I will first refer to the Lungren gas lamp in comparison with the incandescent electric light. The rate usually charged for commercial incandescent electric lighting by the promoters of that system is $1 per month for each 16-candle power lamp supplied, the light to burn from the setting in of dusk to ten o'clock P.M. Placing the average time of daily lighting at five hours, we have, for 312 business days, a total of 1,560 hours per annum. A specimen of the Lungren lamp, consuming 12 cubic feet of gas per hour, will develop 150 candle power, and that rate of burning, carried on during the 1,560 hours of lighting for the year, gives a total consumption of 18,720 cubic feet of gas per annum. At $1.60 per thousand (the rate in Philadelphia), the total cost of gas supplied and consumed is shown to be $29.95. The candle power developed from the Lungren lamp taking up 12 cubic feet of gas per hour is equal to that afforded by nine incandescent lights of 16-candle power each. Now, nine incandescent lights at $1 each per month will cost $108 per annum—or a difference in favor of gas of $78.05.

A second comparison, taking the Lungren lamp and kerosene oil consumed by the aid of improved oil burners as factors in the calculation, reveals the following: A duplex (or round wick) oil burner will develop from 20 to 23 candle power, and will absorb one quart of oil in eight hours. As seven of these will be required to yield the candle power afforded by one Lungren lamp consuming 12 cubic feet per hour, it will be seen that the seven oil lamps will consume 341 gallons of oil in the 1,560 hours, and the charge for oil alone, at 12 cents per gallon, will equal $40.95, the expense of gas being, as before, but $29.95. Here we certainly have proof as to a large percentage of saving gained by the use of the Lungren lamp, taking cognizance of the candle power of the resultant illuminating duty afforded over that secured from the employment of kerosene oil burners of the most approved types.

On motion of Mr. Harbison a vote of thanks was tendered the author.

Amendment to the Constitution.

Mr. Stiness—Agreeably to the notice given this morning I now offer the following amendment to the Constitution: "To amend section IV. of the Constitutution by striking out the words 'or engaged in industries relating thereto.'"

The President—The amendment will be referred to the Executive Committee.

Mr. Stiness—In this connection I desire also to offer the following resolution: "*Resolved*, That the Executive Committee be requested to present any other amendments which, in their opinion, may be of benefit to the Association." Adopted.

In the absence of the author (Mr. J. H. Armington, of Brooklyn, N. Y.) the Secretary was instructed to read the paper, entitled—

SOME SUGGESTIONS ON PAPER WRITING.

For many years it was the custom and practice of those interested in the business of the manufacture of illuminating gas to keep the items pertaining to that manufacture, and also in respect to receipts and expenditures, within their own control; and, too, as other well-conducted companies still continue to do, to regard their business relations as matters in which only their shareholders are interested.

That a wide difference of opinion on this subject is now entertained in this country by the managers of the gas companies may be readily seen by reading the proceedings of the various Associations of gas managers, as published in the journals connected with interests of this kind. Whether these published statements have resulted to the injury or benefit of the public—the

consumers of gas—or to the gas companies, is a question to be looked at from various standpoints. By the public, from the standpoint of their investments in worthless bonds, issued and sold to their dupes by dishonest persons, who are supposed to be engaged in building gas works in various localities throughout the country; by the consumers of gas, in allowing these smooth-tongued schemers to impose upon their credulity by promises that are not, and were never intended to be, fulfilled; and by the owners of gas companies, in localities that are or have been infested by these swindling operators, in the partial, and, in some cases, the total destruction of their property.

Is there any doubt that the most ruinous raids have been made on the old organized gas companies of this country, in consequence of published statements of the business affairs of these companies by (in a good many instances) those who were officers of those companies, and who either desired notoriety, or thought that their business showed better results, as a consequence of their financial management, than that of some other gas company?

If any doubt upon this subject be entertained by any member of this Association, the perusal of the daily newspapers, the published reports of various Associations—our own among the number—the published reports of various State legislative committees, and committees of Congress, will furnish plenty of proof—if proof is necessary—to confirm this statement. Had the writers, who wished to show their business transactions to the world, in connection with the manufacture and sale of gas, gone somewhat further in their publications, and shown that the price of coal, which so largely enters into the cost of gas, is an article liable to the same fluctuations in price experienced by other marketable commodities, and that it would be necessary to fix the price of this article at a specified sum, and naming as that sum a price which would render little or no profit to the companies mining the coal, and had they also ventured to fix the price of labor—that other large factor entering into the cost of gas, and which at the present time is such a very uncertain quantity, both as regards price and the amount of service to be tendered—then, indeed, the public and the consumers of gas would have seen that other interests must be consulted, and materially affected, as well as the interests of those engaged in the manufacture and sale of illuminating gas. It was said, after the appearance of a published report of a committee of the U. S. Senate (issued in July, 1886) to the writer, by a distinguished member of our Association, and after he had read the Senate report referred to, "I think it was a mistake to have published ——'s paper on the cost of gas; and I am almost sorry that it was done."

Our friend who had read the paper furnished that information for those directly interested in the proper and economical management of their business, and with the sole object of making his former statements, and also the position he had originally taken in regard to the proper mode of making illuminating gas, sure and strong with those who were vitally interested in knowing what was to be the result of a new departure in the manufacture, and the further effect of that departure on the present and future of investments directed to the object of the manufacture and sale of illuminating gas. That that paper did furnish this information to those directly interested we know, as we also do that it was at once seized upon and used before a legislative committee by certain interested parties, thereby causing much trouble and unnecessary labor for the officers of the gas company that had been made the subject of an uncalled-for investigation.

That the publication of the business affairs of gas companies has already brought about ruinous legislative enactments is evident from the laws recently enacted by the legislature of the State of New York, and the proposed legislative action on the part of the U. S. Senate for regulating the price of gas furnished by the Washington, D. C., Gas Light Company.* What other legislative bodies may follow the example of the State of New York, in attempting to arbitrarily fix a price at which a manufactured article shall be sold, remains to be seen; but that other legislative bodies will follow this example there can be no doubt.

The writer wishes to be thoroughly understood as not referring in any way to the spreading of knowledge, concerning the most improved and best methods of making illuminating gas, among those engaged in its production, but simply to those who seek to spread before the world every item of cost connected with its production and distribution, and who, in the opinion of the writer, thereby injures instead of advances the interests of established companies. The ignorant and fanatic appeals that have from time to time been made through the newspapers by those who were and are totally unacquainted with the manufacture of illuminating gas, have been, in many cases, based upon statements and figures made by those who should not have published them.

These figures—readily understood, of course, by those acquainted with our business, but totally misunderstood and misplaced by those ignorant of their meaning—have been the means of much misinformation to the general public, and have begotten much animosity towards the companies engaged in furnishing an article so necessary to the comfort of the people. It is, therefore, hoped that hereafter such statements will be either withheld from general publication, or so modified and plainly stated as to be easily and perfectly understood by all who read the daily publications. The everyday management of the business of a gas company involves quite enough of care to keep busy all those engaged in its service; but these cares are added to by complaints on the part of consumers of gas who read those statements which have just enough fact about them to convey a false impression to the minds of those who are ever ready to imagine that they are being cheated. Then the cares and vexations of a manager are increased tenfold, and he fails to be favorably impressed at the lack of good judgment on the part of the one who gave forth the partial fact from which the false statement was manufactured.

That it is our duty to try and make clear to our customers that we conduct our business in a plain, straightforward manner, to patiently hear all complaints they may choose to make, to rectify any mistakes that may have been made, and, if possible, point out the way in which the person having a supposed grievance can in future avoid the same, there can be no doubt. That we should take particular pains to listen to complaints and then explain the seeming trouble is shown in the fact that the large majority of those with whom we deal are inclined to assert gas companies are monopolies, and the charge is brought against them, as against many other companies doing business with the public, that the officers will not listen to complaints, and that redress for alleged abuses cannot be obtained.

Did we believe what is said of us by many newspapers, and also by those who delight to join in the popular cry that all persons, except the criers, are dishonest, we should soon conclude that our business is the only one that honest men have never been connected with, and that those of us who have engaged in this business have been unfortunate enough to have associated ourselves with those who have lived and prospered by defrauding the communities in which they resided.

That none of our own profession may hereafter furnish "aid and comfort" to those who seek to place us in a false light before the public, by publishing partial statements of their business, is the wish and hope of many others than the writer; and if, by having called the attention of the members of the Association to this subject, further injury to our business may be prevented much will have been accomplished towards correcting a great evil, and may prevent further attacks, from thoughtless and unprincipled persons, upon our reputations, and upon our business and property as well.

On motion of Mr. Stiness, a vote of thanks was passed to Mr. Armington for his paper.

Discussion.

Mr. Harbison—I am hardly willing that this paper should be allowed to go on our records as voicing the sentiments of the members of this Association. I hardly believe that the majority of the members agree with the spirit of that paper. I do not believe the interests or the business of gas companies suffer through letting the public know what we are doing. I am not afraid, as representing one company, to have the people whom I serve know what it is doing. I am not afraid to let them know what our gas costs us, or what money we are making. We are trying to do an honest and legitimate business, and the better the people know, and the more thoroughly they understand that the better it is for us. I am not aware that any information has been given to the public, through this Association, in regard to the cost of making gas, which resulted to the injury of any existing company that had been doing a fair and legitimate business. If some gas companies, by having charged exorbitant rates, invited restrictive legislation I think they are alone to blame for it. I fear that such is the case. I do not apprehend we need fear legislation restricting the price of gas in the different cities of the country where but a fair and legitimate price for gas is charged—a price that enables the companies to pay a legitimate dividend on capital actually invested. Speaking for myself, I am not willing that the sentiments of that paper should go forth as the sentiments of this Association without making a protest against it.

Mr. Littlehales—I thoroughly concur in the remarks made by Mr. Harbison, and was about to rise for the purpose of offering the same protest. We meet together to relate to each other the facts in our varying experiences, and we can only improve our practice by letting each other know the results of our experiments; and as the paper just read has no such object I hope the Association will not accept it. I offer a protest against the spirit of it.

Mr. Helme—Might it not be well, as that paper is in the nature of a lecture, neither to spread it on our minutes nor to publish it. For my part I question the policy of ever having papers read unless the writers be present. Several years ago this subject was thoroughly discussed by the Association, and in one case that I recollect a paper was allowed to go over unread for two years, although it finally was read in the absence of its author. In fact, he has not attended any of our meetings since.

Mr. Littlehales—I think that this paper ought to have been dealt with in

* See JOURNAL, Aug. 16, 1886, p. 108.

a similar way. I move that it be laid over to be taken up when the author is present to take part in the discussion.

The President—This paper has been read, and so the case differs from that spoken of by Mr. Helme.

Mr. Littlehales—Then let it not be published.

Mr. McMillin—I forget whether the motion for a vote of thanks was put or not.

The President—It was put and carried.

Mr. McMillin—Is the suggestion now made that it shall not be published?

The President—That is the suggestion of Mr. Littlehales.

Mr. McMillin—I think that would be a mistake. We have voted to thank the gentleman for his paper, and I think it better to have it published with the regular proceedings, although we may condemn the sentiments. There are two sides to all questions, and one view has been presented by Col. Armington, while there are members here ready to present the other side. In fact I think that the members are somewhat unanimous on the "other side" of that question. I do not believe the gas business was ever injured by facts brought out during the meetings of this Association. I think, as gas men, we have been helped in that way; and certainly the community has been helped. I am in favor of letting the world know what we are doing. I think we had better publish that paper along with the rest of our proceedings so that it may be seen how great a mistake a very good man may make. (Applause.)

Mr. Harbison—My motion to not publish the paper is withdrawn, because the publication of it will be followed by a report of what has been said by the members in connection with it. With that in mind, I think the paper ought to be published, and then the public will have an opportunity to judge whether it voices the opinion of one man or of the Association.

Capt. White—I think it would be a very grave mistake for this Association, gathered here as we are for the purpose of exchanging ideas, to receive a paper from Mr. Armington in which he expresses his views upon a topic of very vital interest to us all, and then seek to stultify ourselves by taking the position before the public that we dare not have one of our members express his convictions; and, further, that a paper prepared by him, upon invitation of the Secretary of this Association, and read here before us, should be suppressed. It is the most ridiculous thing I ever heard of. Has this Association got to be so old-fogyish that its members dare not express their opinions for fear of being sat down upon? If it has come to that I think it time that this Association should disband. I think it is due to Col. Armington that his views should be spread in full upon our record. I trust that the paper will be printed in full. Col. Armington is prepared to bear his part of the onus—if there be any to bear; and, as Mr. McMillin very ably said, we wish the public to understand what we are doing in these meetings, and to know that we are trying to make a better and a cheaper gas from year to year. That is what we are here for. We leave our homes and business and come here so that we may be able, by learning and profiting from the experiences of each other, to make better and cheaper gas. I question very much our right to refuse to publish this paper, and insist upon its being duly received and made a matter of record.

Mr. Littlehales—At the time I made the motion to not publish the paper I was under the impression, from the statement of the President, that no discussion was to be had on the paper because the writer was not here to defend it. If this discussion goes along with the paper I am satisfied that it should all be published, and in that understanding withdraw my motion; but I decline, as one member of the Association, to let those views go forth as the views of the Association without a protest.

The President—Mr. Littlehales misunderstood the Chair. It was intended by me to say that Col. Armington, not being present, could not answer questions, but that the paper was open for discussion.

Mr. Littlehales—Then I misunderstood you.

The motion being withdrawn, the regular order was proceeded with.

The President called for the reading of the last paper on the list. It had been contributed by Mr. Charles F. Spaulding, of Brookline, Mass., and as that gentleman was absent from the room when the reading was asked for, the President designated Mr. A. B. Slater to place Mr. Spaulding's remarks on

ELECTRIC LIGHTING

before the members. Mr. Slater read as follows:

Fellow-Members of the American Gas Light Association:—Again we meet in conference to discuss ways and means, to compare notes with each other, and to renew the pleasant friendships formed from year to year in the past. To say that I am pleased to be with you would be superfluous, for I feel that we are friends having kindred interests to consider; and although circumstances have placed me somewhat outside the fold, in that I have been thrown among our whilom rivals in charge of the destinies of electric lighting, still I return to you with enlarged ideas concerning the future possibilities of the gas companies of the country, and with a more liberal (and I believe a truer) idea of the possibilities of illumination by electricity.

We were, as you know, inclined to look upon the electric light as a temporary affair, or a "clothes-line" sort of arrangement which would soon die a natural death, and thus leave us a clear field. That we were mistaken needs no argument of mine to prove. The electric light came, was welcomed, and will remain with us. We ought to look upon its permanency as an acknowledged fact, and endeavor to frame methods by which we shall be able to prevent a ruinous competition. How shall this be done? By fighting the inevitable, or by making the electric light a co-servant of gas? Surely you will say the latter; and the result of my own experience in the electric lighting field during the past two years would endorse the wisdom of that decision.

Now, gentlemen, it is presumed that we meet here as partners in a common cause; we are interested in the gas business because of the profits to be derived therefrom, and not as philanthropists. If we are doing a satisfactory business, why not take such measures as will insure its continuing so? And if we are doing a losing business, why not embrace any chance that may offer to improve it? My advice to those in charge of any gas lighting company, whether prosperous or otherwise, would be to prepare to do both kinds of lighting—electric and gas—and thus best serve the public; for it is from the public we must look for support.

The common arguments against the business of electric lighting are its unprofitableness, and the instability of the methods of production. Both of these are groundless (the first-named notably so), as can be proven by the results attained in any well regulated electric lighting station that employs a good, practical system, and by any company not hampered by a fabulous capitalization.

The whole question of profit is a simple one—it emanates from the fuel, and culminates in the light produced and money earned therefrom. Still I have this to say—that much depends on the choice of a "system," for there are both worthy and unworthy on the market; but between them are some which might be considered as possessing a few of the characteristics of each.

Age and antecedents add nothing to the value of an electric lighting system, for the machines which satisfied the crude ideas and requirements of years ago have been superseded by newer and more improved apparatus. The period has not long since passed since the flickering and noisily-feeding electric lamps were considered good enough—when such a matter as the automatic regulation of a dynamo was a thing unheard of; but now, the public having become aware that a steady and noiseless electric light is a possibility, and companies knowing that a self-regulating dynamo can be obtained, these factors have relegated to disuse the older and more incomplete systems of the past. I speak thus particularly of automatic regulation for dynamos and the noiseless feeding of lamps because I consider them of paramount importance to any company desiring to operate an electric lighting plant and business with profit to itself and satisfaction to its customers. Added to these are the items of cost of maintenance and renewals, which, in some systems, are excessive and render them unprofitable to the operators thereof. Burned out armatures and lamps, the re-turning of commutator segments, renewals of brushes, etc., are items of considerable importance; and if it has been our misfortune to invest in a system with which it is impossible to do away with these, the profit side of our books will look somewhat slim.

So, my friends, whenever you feel it to be to the interest of your company to consider the matter of an investment in electric lighting apparatus, you cannot do better than to buy only after the closest personal examination and inquiry. Let not friendship or prejudice bias your judgment, and consider only the object of securing such a system as may be purchased at reasonable figures, and which may be afterward maintained at small cost.

My own experience in electric lighting has been on the practical side. I have been interested in ascertaining, from actual results obtained personally, just what the possibilities might be in this field. I have listened attentively to the many claims made by electricians and representatives of electrical interests, and then have acted just as I should advise all my friends to act—investigated personally and practically the basis of their claims. To say that I have been disappointed and surprised at the strange discrepancy between some of the claims and actual results obtained goes without saying; but, however, the satisfactory has far exceeded the unsatisfactory.

Now, gentlemen, allow me to suggest that an informal talk on this subject at the present time would be opportune, and I shall be pleased to answer such questions as may be put forward relative to the matter.

On motion of Mr. Harbison the thanks of the Association were tendered to Mr. Spaulding.

Discussion.

Mr. Findlay—I would like to ask those familiar with the matter if the supply of electric light can be made a profitable operation in a village of 4,000 inhabitants. We have gas works in a small village, and last year we sold two million cubic feet. The Thomson-Houston Company have located a plant in our district, and they propose to supply arc and incandescent lights. I have heard many different opinions with regard to the probable outcome,

and I must say I feel rather "shaky." If anyone can help me out I would like to hear from him.

Mr. Littlehales—I would also like to know whether it is possible, as some suppliers of electric light claim, to supply conveniently, from one and the same wire, both arc and incandescent lights. I have understood that that operation involved the maintenance of rather an expensive apparatus to convert the one system into the other. Is the plan practicable?

Mr. Diall—I can answer that question as far as we at Terre Haute (Ind.) were concerned. The Thomson-Houston folks attempted to supply both arc and incandescent lights from one wire, but made a failure of it.

THE QUESTION BOX.

The President—We will now take up the question box. The first question is—

"How can the demand for tar be increased, and larger profits be realized therefrom?"

I suppose Mr. Page has studied this thing so that he can answer the question concisely, and in a few minutes tell us all about it.

Mr. Page—A proper reply to that question cannot be made at this late hour; but those who follow the course of the residual market in this country and in Europe know that there never has been a time of greater depression in the matter of the sale of residuals; and that depression has largely grown from natural causes. First, I may state that the greatest consumption for coal tar abroad is for making artificial fuel, while with us it has been most largely used in making roads. Abroad, the low price of fuel has interfered with the consumption of pitch, and great quantities of it have accumulated. But little income has been derived from that source. On this side of the Atlantic the roads, instead of being made of asphalt from coal tar, as formerly, are being made from the imported natural article, a result largely brought about by the wealthy corporation that has the exclusive concession for mining asphalt at Trinidad. This company has branches in various cities, and the natural asphalt, being cheap, has taken the place of the coal tar article. Again, the use of creosote oil having in the past been carried on to so large an extent that the timbers in the great docks and the ties in the railroad beds have about all been treated—there is but little wear and tear on or decay in them—the natural outlet for creosote oil has been diminished, and its price has gone down from 3d. or 4d. to 1d. per gallon. In fact the consumption of creosote has decreased to such an extent that it has been impossible to sell it, and much of it has been burned under the retorts and boilers of the different gas works. The price of pitch has diminished from 35s. or 40s. per ton to 6s. and 8s. per ton. The great increase in the use of the benzoles for color making, and the great profits derived therefrom by the earlier manufacturers, caused tremendous competition; and now enough benzole is made in Germany in one year to supply the demand of England, France, and America for two years. In consequence anthracene has gone down from 6s. per unit to less than 1s. per unit. So each of these products could be mentioned in order; and therefore at the meetings of the directors of foreign gas companies, and at the Association meetings, we hear the question constantly asked, "What shall we do with our tar?" The final determination was, to make a value for the portion really required, to burn the excess; and that has been done. Tar is worth so much per gallon as fuel in place of coke; and in order, therefore, to secure a good price for the balance, a part of it must be consumed under your retorts. That is the most economical way.

Mr. Littlehales—During the last two years we had much experience in the using up of our tar. Tar is not easy to store; but I do not think it is desirable to burn it, provided a better plan be at hand. Five or six years ago the Company (Hamilton, Ont.) with which I am connected laid down one or two hundred square yards of asphalt pavement made out of tar and ashes. Having stood for some years it showed such excellent results that the City Engineer and Board of Public Works decided to try it on a larger scale. They were anxious to get as good work as we had secured in our experimental section, and so they asked us whether we would undertake it for them. Last year we laid about 7,000 square yards, and during the past summer we put down 9,000 square yards, at a cost of 55 cents per yard. That enabled us to get at the rate of $2.75 per barrel for our tar, and a fair margin of profit on the work besides. I am perfectly satisfied our Company can make a grand market for its tar in that way. I believe it is advantageous to take charge of the pathmaking ourselves, because if left in the hands of contractors, whose only interest it is to make all they can out of the job, poor work will be done, and the system will be condemned. That was the reason why we took charge of it. We wanted to have sufficient work done of such a quality as would insure a standard. We would have laid last summer a greater number of yards of pathway if we could only have secured a greater supply of the sort of ashes necessary to make a good job.

Mr. Greenough—Has the business been so prosperous that you would like to buy 30 or 40 thousand barrels of tar?

Mr. Littlehales—If we could get two or three hundred carloads of ashes we could safely buy a few thousand barrels of tar.

Mr. Nettleton—I was about to suggest the same thing spoken of by Mr. Littlehales. In our part of Connecticut (Birmingham) the soil is sandy, and in consequence tar pavements have been laid to a very large extent. The gas companies in our neighborhood have no difficulty in getting rid of tar at good prices. The tar pavement comes cheaper than stone; it remains even and smooth for years, when well laid on sandy soil, and is very comfortable. Where a loamy soil is met the loam is dug out to the depth of 12 or 18 inches, then sand is shoveled in and the pavement laid thereon. It is not necessary, however, as Mr. Littlehales seems to think, to use all ashes. The bottom course with us is made of cobbles, two to three inches in diameter; the top coating is composed of sand and ashes, in the proportion of two-thirds sand to one-third ashes, mixed thoroughly with tar, and spread on with a roller. It makes a very serviceable pavement. In our neighborhood no tar is sold at less than $2 per barrel, and sometimes it brings considerably more.

Mr. McMillin—Mr. Greenough privately suggested an answer to that question a few minutes ago, but he was too modest to give it to the Association. I think it is a very good one. He suggested that the Philadelphia Gas Trust convert the Quaker City works into a water gas plant, and then gas tar would at once be worth $2 per barrel all over the country. Our remedy for low tar prices at Columbus, Ohio, was to get a complete set of drawings for a plant for the manufacture of tarred paper, benzole, or every other product that could be made from coal tar. We next let that fact be known generally to the coal tar manufacturers and chemical works, and the price for tar at our works went up right away from 2½ to 4 cents per gallon.

Mr. Lowe—I would like to ask Mr. McMillin if he did anything with that complete set of drawings?

Mr. McMillin—I loaned them to our friend Page. In fact I think I borrowed them from him in the first place.

Mr. Lowe—Such being the effect, I think every member of this Association had better procure a similar set of drawings at once.

Mr. Turner on Earthquakes.

The President—Someone wishes to know if Mr. Thomas Turner, of Charleston, S. C., will kindly relate some of his recent earthquake experiences. Another querist asks, "Will Mr. Turner, of Charleston, S. C., inform us whether the late earthquake in that city caused any breakages in gas mains or services, and what its effect was upon the gas supply?"

Mr. Turner—Mr. President and gentlemen, I do not know why I should be called upon specially to tell you (for I am pretty much like everybody else, I know little or nothing about them) about earthquakes. To be sure, we had a very severe earthquake in Charleston, and I can speak as to the effects of this one which damaged our works materially—so much so that, notwithstanding all our efforts during six weeks to find out and stop the leaks, our leakage was nearly 60 per cent. for the month of September, and at the commencement of that month must have been about 75 per cent. The mains, particularly at the crossings and intersections of streets, were very seriously disturbed. In a space the width of the street, and from 25 to 50 feet beyond, as many as seven or eight breaks would be found. The services of all calibers, from three-quarters of an inch up, were literally torn out of the mains, very often they carried a portion of the main with them. Our works are pretty badly wrecked. Nearly every building will have to come down. So far as we can ascertain, at present at least, our tanks were not injured. The main tank and holder is at our works, and smaller holders are distributed in different parts of the city. The holder tank at the works, which is 26 feet deep, 98 feet diameter, and built of brick, oscillated to such an extent that the earth or backing at the level of curb was pushed back 8 inches to the southeast, showing the wave was in that direction. The tank recovered its original position, leaving the earth as before. As far as I have been able to ascertain from scientists the effect of this earthquake was pretty much like that of dropping a pebble in a pool of water; from the center the waves diverge in different directions. We were to the south of this center. At Summerville, where I was residing at the time, the waves seemed to go in a northwesterly direction, and at other points they seemed to go in a northeasterly and southwesterly direction. Our manufacturing plant in Charleston was not materially injured. After some little delay we were able to continue furnishing gas. Around our works the joints of pipes and connections were dislocated in many instances. For example, the cover of a dry centervalve was jammed out of its place until every box was passing foul gas.

Mr. Lowe—To what extent were your street mains injured?

Mr. Turner—I am not able to tell that. I suppose I have repaired, up to this time, about 100 breaks. I know there are quite a number more, and I find, on the lines of upheaval or waves, the joints drawn and leaking badly. This I am afraid will be our principal difficulty. I suppose that our leakage at this time is fully 40 per cent., but I hope in a few more weeks we will be

able to get it within reasonable control; yet the task seems almost endless, and later shocks have again disturbed them.

Mr. Helme—Your benches were built on piling?

Mr. Turner—They were originally built on piles, but having changed that mode of construction some years ago, they are now built on a concrete bed, which is virtually floated, as it were, on bluff mud—a local term—and I believe to that fact the salvation of our benches is due. They were not disturbed, except that one or two tie-rods were broken, and the upright flues to one stack thrown down. That foundation of concrete is about three feet thick. The benches are built on inverted arches, of the same size as the arch of the oven. I was in hopes to have had here some photographs of our coal stores, showing their condition, but they have not yet arrived. I think the disaster to our coal house was principally due to the large amount of coal on hand, the coal, being piled against the walls, when the shock came overthrew them.

Mr. Helme—In case you rebuild do you not think that a strongly timbered coal house would be better?

Mr. Turner—That would affect our insurance.

Mr. Helme—But, putting the question of insurance aside, do you not think that if the house had been strongly timbered it would have stood the "racket" better?

Mr. Turner—I do not think so. I think the large amount of coal we had in store would have burst out the woodwork just as it did the brickwork. We store our coal about 15 feet deep, and the piers of our coal shed are 15 feet 6 inches apart. These piers are 2 feet 6 inches square, and a curtain wall 18 inches thick, on the closed side, battered from the outer edge of the pier at the bottom to the inner edge of the pier at the top, runs from pier to pier. The walls and piers are torn out a foot below the joists.

Mr. Helme—Did you find the iron frame of the retort house roof injured?

Mr. Turner—Only the purlins running into gable end, which came down on coal shed. I believe the safety of the retort house is due to the new iron roof, which I put on two years ago, and to the mode of construction. I believe it is the universal practice to simply lay the roof on the walls, but in this case I had bolts made to go three or four feet down into the walls, with a plate built in brickwork, and I think that the safety of our retort house is due to that fact. It is in pretty good condition excepting at the gables and corners to first rafter which will have to come down. The inlet and outlet pipes of the tank do not seem to be injured; and I think that fact is due to the peculiar nature of the ground in which our tank was built. The first section of brickwork was put in on the surface of the ground, the mud was then excavated, then another course put in, and so on down to the bottom. This mode of construction was due, I believe, to Mr. J. P. Kennedy.

Mr. Helme—How did you fare on your wharves?

Mr. Turner—The wharf is pretty good, but our railroad track, which is 800 feet long, was thrown bodily 13 inches to the east—that is, endwise. The wharf is built on piles. There is a shed near to us belonging to the South Carolina Railroad Company, which contained at the time 1,500 tons of guano. That shed was moved bodily eight feet and some inches. It was also built on piling. I can tell you, gentlemen, there is no uncertain thing about an earthquake, and I do not know what sort of structures you will have to provide if you are likely to be visited by one. A writer on one of our daily papers remarked that the causes of earthquakes are pretty much the same as they were 100 years ago. He compared it to the drying of an apple—the escape of the gases from the interior wrinkles the skin—and he suggests that Charleston has had its "wrinkle." Of course, everybody has a different theory as to cause of earthquakes, and it is hard to say who is right. One of our clergymen, a noted geologist, who thoroughly understands the nature of our soil, says that Charleston is situated on an alluvial deposit, whereas Summerville, where I was residing at the time of the disturbance, is built on a marl and phosphate deposit, with an underlying strata of limestone caverns, and he attributed the earthquake shock to the caving in of these limestone caverns. Whether he is right or not of course we do not know. Others seem to think that there has been a subterranean upheaval, which fissured the ground and forced the underlying water and sand to the surface. This latter seems to me very probable.

Mr. Helme—Did it affect your artesian wells?

Mr. Turner—Not at all. One, which is about 2,000 feet deep, was apparently not affected in the slightest degree. It affords fresh water of a mineral nature or tincture.

Mr. Helme—How was the section from whence the phosphates are taken affected?

Mr. Turner—The whole face of the country shows fissures and geysers. A hole appears in the ground, and water is thrown from it two or three feet, bringing up with it 12 to 14 different kinds of sand. I have at the hotel some specimens of this sand which were thrown out by the geysers.

Mr. Helme—Do they come from as low down as the phosphates?

Mr. Turner—They are from below the phosphates, I believe. The phosphates are generally near the surface.

Mr. Helme—I saw a newspaper statement to the effect that no case had been found of any disturbance below the phosphates. Does that seem to be correct?

Mr. Turner—I was informed that one fissure had been sounded with a twenty-foot rod, and no bottom found. I said I was living at the time at a place 22 miles from Charleston—Summerville by name—which seemed to be the center of the disturbance. I firmly believe if they had had in Charleston as severe a shock as we had in Summerville there would not have been a brick house left on its foundation. At the time of the shock I was thrown ten feet into the house, and almost instantaneously thrown out again. A member of my family was thrown from one room into the middle of the next one, and a neighbor, in the act of closing the shutters, was thrown through the window into the lot.

Mr. Helme—How did you fare at your office?

Mr. Turner—Our office was but slightly damaged. It is a most singular feature of the result of the earthquake that you may go along the streets in Charleston and out of three stores or houses close together two of them will be found completely wrecked, while the third was hardly injured at all.

Mr. Helme—Was the wall on the battery disturbed?

Mr. Turner—The walls were not disturbed, but the houses in that district were very badly injured. The greatest damage was at the lower end of the town, or where the greatest number of brick and stone buildings were to be found. The frame houses do not seem to have suffered much externally. Some assert that the shock came from the southeast, from the sea, and others say it came from the southwest; but I rather think everybody was so thoroughly demoralized that they did not know from which way it came.

The President—It was claimed, in some of the northern papers, that the material used in constructing the houses in Charleston was bad, and that that weakened them. How is that?

Mr. Turner—That may be so in some cases, but in very few. You who have visited Charleston know that on their building work they favored a great deal of ornamentation. Heavy cornices of brickwork are the style, which would tend very naturally to overload the walls and lead to injury from such a shock as this; but instances are quite numerous where the best kind of work, which would be difficult to take to pieces, is so badly shaken as to require to be taken down. Here in the North you use a great deal of galvanized iron for cornices; and I do not think our buildings would have suffered so much if they had had that sort of cornice. Still, it is hard to say, under a shock like that we experienced, what would have been the result, and I doubt if the brickwork in any city could have withstood it intact.

Mr. Helme—Charleston was a well built city at the time of its erection; and they can say what they like about the workmanship displayed, but I believe no other city of this country had more care taken in its construction than was the case in the original Charleston plan.

Mr. Turner—All of the older buildings were built of the best gray brick—as good a brick as can be found anywhere in America—carefully laid up in good shell lime. Only of late years has stone lime been used. No better mortar could have been used than that employed in the construction of our coal sheds. The walls as a mass were not disintegrated, but pieces of them were thrown out in solid chunks. I have seen instances where the bricks, though broken in small pieces, still held together by the mortar—showing the best material and construction possible.

Mr. Young—Have you had any gas explosions as a result of the earthquake?

Mr. Turner—None at all. I at once advertised in the daily newspapers cautioning people to have their gas fixtures examined. I found, in a number of instances where buildings had been shaken, that all their fittings were more or less distorted and dislocated, and some rather curious instances of increased bills resulted from that fact. There were no leaks perceptible in the buildings, but of course the gas would ascend and make its escape through chinks in the roofs.

Mr. Lowe—I should have thought, from the number of breaks, that in some cases the gas would have passed from the street mains into the houses, and so caused explosions.

Mr. Turner—One thing possibly acted as a safeguard against that. For the first three weeks or a month the majority of the people lived out of doors, and very little light was used in the houses.

Mr. Lowe—What is the character of the soil in which your pipes are laid?

Mr. Turner—It is a very porous soil—chiefly sand, with a substratum of yellow clay. Our pipes (or many of them) are laid in the made land rather than in the "virgin soil," as they term it.

Mr. Lowe—At what depths are they laid?

Mr. Turner—At depths varying from 10 inches to 2 feet.

Mr. Lowe—I move that the sympathy and well wishes of the Association be tendered to Mr. Turner and the Charleston Gas Company in this their hour of misfortune, and also that we thank him for his explanations.

The motion was unanimously carried.

Uniformity in Meter Connections.

Mr. Hyde—It is well known to all gas men that we have considerable trouble in making meter connections, because the manufacturers do not make uniform sizes. It seems to me to be desirable that there should be some action by this Convention calling on the different meter makers to agree upon and adopt a uniform standard size. I move that the President appoint a committee of three, who shall endeavor to establish a uniform size of connection for all meters, so that gas companies will not continue to be annoyed, as they now are, from the existing diversity.

Seconded by Mr. Harbison, and adopted. Messrs. F. C. Sherman, of New Haven, Conn., H. B. Leach, of Taunton, Mass., and C. F. Prichard, of Lynn, Mass., were named to compose the committee.

The Proposed Formation of an Association for Pennsylvania.

The Secretary stated he had been asked to announce to the members the formation of a new Association to be called the "Pennsylvania Gas Association."

Votes of Thanks.

Mr. Littlehales—I feel it to be due to our worthy President, before we disperse, to express our appreciation of the way in which he has presided over the meetings of this Association. I therefore move a vote of thanks to President Wood for the manner in which our business has been conducted by him. (Seconded by Mr. Harbison.)

The resolution was unanimously adopted, by rising vote.

The President—I thank you, gentlemen, for this kindly expression of your good will. I have, in this as in all other things, and on all occasions, endeavored only to do my duty. If I have accomplished that I can retire with satisfaction to myself. I believe that the Association will remain under my care until to-morrow evening, when we shall finally disperse; and I will try to lead you, under the direction of the Committee of Arrangements, through the byways and highways of our journey to-morrow.

Mr. Harbison—I desire, in behalf of the Association, to move a vote of thanks to our able Secretary for the very satisfactory manner in which he has conducted the duties of his office during the past year.

The President—The thanks of the Association are eminently due to our Secretary.

The resolution was unanimously adopted, by rising vote.

The Secretary—I am gratified, Mr. President and gentlemen, by your kind expression of approval.

The business sessions were thereupon declared adjourned.

A Supplement to the Chapter on Practical Gas Making.

By Frederic Egner.

A number of inquiries have been received by the writer with regard to this or that point mentioned in the article which appeared in a recent issue of the Journal.* It was therefore deemed desirable to explain more fully the subjects referred to in that "Chapter." The method employed to enrich coal gas by means of oil, the results of which were given in the issue of the Journal mentioned, was designed by the late Mr. I. Herzog, formerly Engineer of the Metropolitan Gas Light Company of New York city—the writer acted as Mr. Herzog's assistant at a period of a dozen years ago, at which plant this manner of enriching coal gas was then in use. A small tank was placed on brackets fastened to the exterior of the retort house wall at a point high enough to give a head of from 4 to 6 feet to the stream running to the retort which it was intended should be used for oil. A ¼-inch pipe was run from the bottom of the tank to the inside of the retort wall, and then furnished with a good valve. A nipple and tee-piece were screwed into the valve. One side of the tee received, through the aid of suitable nipples and ells, a long glass tube intended to show the height of the oil in the external storage tank. The other side of the tee was connected to a glass gauge, in all respects similar to the glass water gauges used on steam boilers. Though this gauge the oil had to pass, and so the size of the stream could be always seen or noted; and that, of course, is of great assistance to the operator. Being entirely closed, there was no possibility of the oil taking fire. From the bottom of the gauge the oil was led, through a ¼-inch pipe, to the mouthpiece of the retort in which it was intended to be decomposed. A hole, sufficient in aperture to admit a ¾-inch pipe, was drilled through the side of the mouthpiece, and the crevices around the pipe were made good by the application of a few handfuls of clay luting. Just outside the mouthpiece the feed pipe was fitted with a ¼-inch service cock, a nipple, union, reducer (from ½-inch to ⅜-inch), and a short piece of ⅜-inch pipe, furnished with an ell and another nipple, about 4 inches long, completed the belongings of the oil feed pipe into the retort. The ⅜-inch pipe was passed through the mouthpiece from the inside, then the reducer and union were screwed on, and thus the connection was made. Leather or asbestos washers only should be used about the oil pipe, because rubber soon dissolves when in contact with naphtha or crude petroleum. The 4-inch nipple referred to just enters the open end of a piece of 3 or 4-inch cast iron pipe laid into the retort, and serves to conduct the oil into said larger pipe. The latter is laid so as to have a slight fall toward the back end of the retort, and should reach to within 8 or 10 inches of the back end. The point at which the ¾-inch pipe enters is also securely closed up with clay luting. Bricks are laid around the large pipe in the retort in such a manner as to completely cover it (the pipe), or suitable tiles might be provided. All the foregoing being attended to, put on the retort lid, and you are ready to start in the making of oil gas.

It has been found, in practice, that one retort in a bench (the remaining retorts of which were charged with coal), kept at a good working heat, would carbonize at the rate of 10 gallons of gas naphtha, or 8 gallons of crude petroleum, per hour, for weeks at a time, and without any stoppage. If the oil retort is provided with any arrangement for bye-passing the seal in the hydraulic main, it will work all the better for it. It will be found that the "color" of the oil retort when in operation, and naphtha being used, will be of a dull red; with crude oil, a bright red—this, too, when the coal retorts may show a white heat. Should the oil retort color show brighter or darker, less or more oil should be fed in. As the writer has followed this system for years, he is able to speak positively in regard to it. Let it not be understood, however, that the method described is put forward as the best plan for making a pure and simple oil gas. Such claim would be grievously in error. But it is advanced as the safest, simplest, and probably the best way to use oil as an enricher of coal gas. The coal gas will carry nearly all of the oil vapors—that is, those which were not thoroughly gasified or decomposed in the retort—for a long time; and such oil as may be found in the drips will be seen to be of much heavier grade than that originally fed into the oil retort. Its color also differs; in fact, the drip deposit is little else than naphthaline dissolved in naphtha. Where the above-described process or method of enriching is carried on no stoppages from naphthaline will occur.

The preceding directions, it would seem, ought to make plain to anyone the manner of enriching coal gas with oil referred to by me in the previous "Chapter." It might be added that, to work with advantage, an exhauster is necessary.

It is next in order to describe the process by which a product of over 6 cubic feet of 22-candle gas was obtained from a coal that ordinarily produced only 4.25 cubic feet of 14-candle gas. The coal alluded to was the Indiana caking variety, mined in Washington, Daviess County, Ind. The process of working being the invention of the writer, for that reason, and also because it had not yet been sufficiently tried to satisfy him, as a gas engineer, of its permanent benefits, so little was said about it. For good and sufficient reasons, which, however, are of no general interest, scarcely a week's steady work has been had with the new apparatus as a coal bench. The initial trials nevertheless were such as to encourage further attempts, the results of which will be made known to the readers of the Journal in due time. Briefly, at present it may described as consisting of an ordinary coal gas bench. The gas and vapors generated in the retorts do not pass directly to the hydraulic main, but travel from the mouthpieces of the primary retorts into the mouthpieces of narrower vessels, or fixing chambers. Having passed through these they are directed into the hydraulic main, as usual. That the vapor from the coal near the mouthpieces is not all converted into gas must be plain to every gas maker. This has been demonstrated by many—notably by Mr. Darius Davison, whose system is (or deserves to be, at any rate) well known. It is conceded that the tar vapors might, for the greater part, be converted into a very rich gas; but it is equally well known that, once the tarry vapors become *tar*, it does not pay, for many reasons, to attempt to gasify them. While in a vaporous state they might be acted upon, to some extent at least. European, notably English, engineers have acted on that theory to a great extent. The great danger in gasifying tar vapor is that the process might be carried too far, and hard deposits difficult of removal be lodged in mains and connections. The writer, however, believes that two or three thousand cubic feet more of a rich gas than is now obtained can be extracted from each ton of coal carbonized; and that would well recoup us for any losses chargeable to a decrease in receipts for sales of tar—at all events at the prices now prevailing for that residual. The other residuals—coke and ammonia—would not be interfered with at all, for these would remain as before, or as they are.

*See Vol. XLV,, Dec. 16, 1886, p. 363.

A Lecture on Natural Gas.

A lecture on the subject of natural gas was delivered at the Franklin Institute, on Saturday evening, December 18th, by Mr. Charles A. Ashburner, Geologist in Charge of the Pennsylvania Geological Survey. The lecturer stated that natural gas was by no means a recent discovery. Even its utilization for the purposes of the mechanic arts had been successfully attempted in

China, where, by pipes of bamboo, it had been conveyed from natural wells to suitable furnaces, where, by means of terra cotta burners, it was consumed. In the confines of Persia, in the south of France, and in our own Western States, burning springs had long been known. When Lafayette visited this country in 1821 the inn in the town of Fredonia, N. Y., was illuminated in his honor by gas procured from a neighboring well. It is, however, only within recent years that natural gas has arisen to any importance in its bearing on the mechanic arts. At present the great iron and glass works of Pittsburgh and of other places are supplied with natural gas as their only fuel, and millions of cubic feet are yearly consumed in Pittsburgh and similarly situated cities.

Of the origin of natural gas there seems to be no reasonable doubt. It arises from the decomposition of forms of animal or vegetable life embedded in the rocks in suitable situations. The gas is not believed to be generated continuously, but merely to be stored in porous or cavernous rocks overlaid by impervious strata. When these collections are tapped the gas is set free, but a new supply is not being formed to take its place. The position at which the gas is found is very variable, depending upon the force of gravity, and upon the position of the porous layer in which the gas is confined. The lecturer entered into an accurate description of the localities in which the gas was found, and gave the reasons why it was hopeless, from geological grounds, to look for natural gas east of the Alleghenies. The regions in which the gas is found is practically embraced in that portion of Pennsylvania west of the Allegheny mountains, and extending a short distance into Ohio, New York, and West Virginia, and it is also stated to have been found in a very limited extent in Illinois and Kansas.

The most important economic locality is that in the immediate vicinity of Pittsburgh, which supplies that city with the fuel for the vast iron and glass works and for numerous private dwellings. There are six natural gas companies in that city, managing 107 wells, and supplying the gas through over 500 miles of pipe, of which 232 miles are situated in the city proper. The total area of pipe leading into Pittsburgh is given as 1,346,608 square inches, and the total capacity of the lines is estimated at over 250,000,000 cubic feet of gas per day. The largest company is the Philadelphia Natural Gas Company, which supplies over 400 manufactories and over 7,000 dwellings with the entire amount of fuel consumed. The composition of natural gas varies greatly, both in specimens from different wells and in those from the same well at different times. In general terms it can be described as a mixture of hydrogen, nitrogen and marsh gas, with occasionally higher carbon compounds. It burns with a nearly colorless flame, and gives off no odor or deleterious matter.

In speaking of the use of natural gas for domestic purposes, Mr. Ashburner pointed out the great advantages which a gaseous fuel has over a solid one like coal, and stated his belief that the greatest of the advantages of the discovery of natural gas was that it had proven the great economy and practical utility of such fuel. A thousand cubic feet of gas was calculated to equal in heating capacity 55 pounds of coal. He stated that the use of natural gas for domestic purposes would not have been possible without the inventions of Mr. Westinghouse, of Pittsburgh, two of whose inventions the lecturer illustrated. One of these inventions was intended to prevent leakage from gas pipes, and to locate leaks accurately when they occurred. The leaking gas is conveyed to the nearest lamp post and there consumed. Another invention was a most ingenious pressure regulator, which not only regulates the pressure at which the gas is supplied to the burners, regardless of the pressure in the mains, but in the event of the pressure in the mains dropping to zero automatically shuts off all gas from the house; nor is it possible to turn the gas on again without violence to the regulator until every source of escape of gas larger than a pin-hole leak has first been corrected. A model of the regulator was exhibited. The lecture was illustrated by drawings and maps, and by a small working model of a well-boring apparatus.

In answer to inquiries the lecturer stated that the source of natural gas was certainly capable of exhaustion, but that he did not think there was any imminent danger of such a calamity. The sources of supply would certainly last many years, and he believed that before they would give out a method of producing an artificial gas would be invented which would perfectly supplant the present natural gas. The cost of natural gas could not be compared with our coal gas, for the reason that the natural gas was not sold by meter. The consumer makes a yearly contract with the company to supply him with light or fuel, or both, at certain rates. A house containing twelve rooms costs, to heat and light, from $70 to $90 a year. The use of the gas is most satisfactory, for by means of an automatic regulator every room of a house may be kept at a temperature not varying two degrees, regardless of the condition of the outside temperature or the pressure on the mains. Defects and troubles were met with from lack of understanding how to properly regulate the supply or the combustion.

In reply to the question as to whether he thought it wise for the city of Philadelphia to lease the gas works for a term of years, Mr. Ashburner replied that, as a business man, he would say that any scheme for supplying the ordinary form of coal gas was, at the present time, extremely uncertain as a business venture. He believed that a very short time would demonstrate that there was a method of generating a fuel gas which would totally supplant all present modes of heating, and that electricity had already solved the problem of illumination. We were in a transition stage with regard to both heating and light, and for these reasons, and from this standpoint, he would regard any movement as undesirable at this time.

Naphtha as an Enricher.

By A. S.

There seems to be wide difference of opinion among gas engineers as to the value of naphtha as a producer of gas. While some will treat it with scorn and contempt, and hold that it will not yield a true gas, but merely vapors which will, when used to enrich coal gas, condense, or cause the gas to smoke, or to stratify, etc., etc., others will attribute to the same naphtha mysterious powers, and expect it to do wonders even when used in quantities ever so small.

We have all read of the Ohio man who lately announced his invention for turning one barrel of oil (weighing, say, 300 lbs.) into 450,000 cubic feet of a brilliant gas, weighing some twenty odd thousand pounds.

In the issue of the American Gas Light Journal,* of Dec. 16th, 1886, we further find results obtained from naphtha as an enricher of coal gas at the Laclede Gas Works, St. Louis, Mo., which, while falling far behind the Ohio man's achievements, still are rather astonishing.

It appears, from the statements published in the Journal, that a ton of Youghiogheny caking coal yielded 10,953 cubic feet of 17-candle gas, the density of which may be assumed to be 0.430. The oil used for enriching purposes is stated to be 62° Beaumé, a gallon of which would weigh about 6 pounds (commercial naphtha 68°—72° B., weighing 5¼ pounds per gallon).

Taking up the results obtained in Sept., 1886, we find that a ton of mixture contained 4.8 gallons = 28.8 pounds of naphtha, and 2,240-28.8 = 2,211.2 pounds of coal, and yielded 12,163 cubic feet of 19.66-candle gas, the specific gravity of which not being given may be assumed to be 0.465, allowing a rise of 0.013 in density for an increase of one candle. The weight of the 12,163 cubic feet of gas is, then, $12{,}163 \times 0.465 \times 0.0766 = 433.23$ lbs.

The gas obtained from the 2,211.2 pounds of coal amounts to 10,812 cubic feet, weighing $10{,}872 \times 0.430 \times 0.0766 = 356.12$ lbs.

Then we have—

Weight of gas obtained from 1 ton of mixture.....	433.23 lbs.
Less " " " 2,211.2 lbs. of coal.....	356.12 "
Leaving weight of gas from 28.8 lbs. of oil.....	77.11 "

Even allowing that every particle of the oil had been converted into gas, there would remain 48.21 pounds of gas, the source of which cannot be discovered in the above-quoted statement.

Or, putting it in another way, we have the weight of the 12,163 cubic feet of the enriched gas equal to the weight of gas obtained from 2,211.2 pounds of coal (356.12 lbs.), plus weight of gas obtained from 28.8 pounds of oil, making 384.92 pounds. The specific gravity of this enriched gas would then be—

$$S = \frac{384.92}{12163 \times 0.0766} = 0.413,$$

from which it would appear that the gas decreased in density from 0.430 to 0.413, while its luminosity increased from 17 to 19.66 candles. This runs exactly counter to all heretofore accepted theories about the density of gases in relation to their illuminating power (water gas excepted).

If a gallon of commercial naphtha (5¼ lbs. per gal.) could be entirely converted into a fixed gas, without any loss by tarry condensation, or by formation of carbon, or lampblack, it would yield 5¼ lbs. of gas, equal to 88.3 cubic feet, the density of the gas being 0.850. As a matter of fact there is considerable loss during the distillation, fixing and cooling of the naphtha gas, no matter what process is used. A yield of 80 cubic feet of 70-candle gas is probably the best that can practically be obtained, and that only by careful working. The heavier oil used at the Laclede works will hardly give better results.

Applying this yield per gallon of naphtha to the example furnished in the statement quoted above, we have—

Gas from 2,211.2 lbs. of coal =	10,812	cu. ft. ×	17	candles =	183,804 can. ft.
" 4.8 gallons of oil =	384	" ×	70	" =	26,880 "
" 2,240 lbs. of mixture =	11,196	" ×	18.82	" =	210,684 "

11,196 cubic feet of 18.82-candle gas would, then, seem to be all that could be expected from such a mixture.

* See page 363.

The Gas Companies and the State.

The leading editorial in the issue of *Iron Age*, dated December 23, 1886, was as follows:

The animated discussion in business circles and in the newspapers of the Reagan-Collum bill has again brought prominently before the public the delicate question of defining the limits of State interference in the relations between the public on the one side and corporations operating under charters on the other. As is usually the case, the extremes are now only heard, and the representatives of the railroads notably are prophesying destruction to great vested interests and ruin to important business interests. We are inclined to be skeptical on these points, and cannot help believing that before many years have passed there will be a revolution among railroad men similar to that which has been quietly going on among gas managers. Gas companies formerly had the distinction of being among the first upon which the dislike of the public descended. They have certainly themselves to blame for it principally, and many of them have keenly felt the result of it through the eagerness of town authorities to give privileges to the first one who promised them the blessing of competition. Too many of those who took advantage of the antagonism of the public were men whose aim was to force the older companies to buy them out. The majority of the latter have suffered from this kind of blackmail and have grown tired of it. From an attitude of defiance, alike dangerous to themselves and to consumers, they have reached quite a different point of view. The public, too, has learned by bitter experience that to welcome sham competitors is to pay for the excitement of a brief "gas war," and to saddle itself with the interest and profits of two plants instead of one. The gas companies have, therefore, slowly changed front, and, so far as can be judged from the discussion at the meetings of their associations, they have reached the conclusion that a guarantee of immunity from attacks is worth to them many concessions which formerly would have been denounced as the crazy claims of demagogues. The gas companies seek this protection through the agency of State Gas Commissions. An interesting discussion of the subject from their point of view followed the presentation of a paper by Mr. Geo. G. Ramsdell, before the last meeting of the American Gas Light Association. We may confess that the paper itself and the tone of the discussion following it, as printed in a number of recent issues of the AMERICAN GAS LIGHT JOURNAL, were a revelation to us. His views are almost radical, and yet speaker after speaker rose to support them or to emphasize some of the points deserving of consideration.

The situation is regarded by the greater number of progressive gas men as follows: We have in the past made serious blunders in neglecting to consider the fact that our investments are largely in the nature of permanent sinking of capital in plant which cannot be removed or be made available for any other purpose. While possessing a monopoly, abuse of the power thus given is likely to thus create opposition more or less reasonable. This finds expression in the form of encouragement to rivals, with whom often the most profitable part of the business must be shared, or the alternative be chosen of buying partly unnecessary plant, and paying profits to hostile promoters. So widespread has this source of loss become that gas companies not yet attacked formerly believed it sound policy to accumulate a fighting fund. To press the maximum dividends on copiously watered stocks seemed to be the sole ambition of the management. Now the progressive men in the business recognize the folly of what was once a general tendency. Practically they say: "We are willing to put the details of our business before a State Commission as the representative of the consumers, to convince them that we are ready now and in the future to deal fairly with the public. All we want is a fair profit on money actually invested, a moderate allowance for reserve and surplus, and a sliding-scale arrangement by which the gas company is given a share in the distributive profits in proportion to the advantages accruing to the consumer in cheaper rates." As an equivalent they ask that they be guaranteed against competition, or, in other words, that they be given a monopoly, though the latter term is carefully avoided, probably because to many it has an odious ring.

So far as the interests of the public are concerned the principles embodied in the new movement of the gas managers are sound. We have already alluded to the fact that sham competition and the sinking of excessive amounts of capital in gas plants prejudice the interests of the consumer in the long run. If sure that they are paying only a fair profit on honestly-invested funds, and that they are to share in the benefits which increased consumption and reduction in costs bring with them, the consumers will be content to abide by their part of the bargain. The leading principles being mutually acceptable, the main question becomes the elaboration of details. During the discussion of the subject at the meeting alluded to a glimpse of the difficulties which would be encountered in this work was obtained when a figure had been named which some considered a fair rate of profit to shareholders, based on capitalization and sales. It became at once evident that what would prove an inadequate return to a company in a small town would yield enormous profits to concerns furnishing our large cities with illuminating gas. Some distrust was shown concerning the possible *personnel* of gas commissions, and doubts of the same character might arise, too, in the public mind. Massachusetts has had such a body for some time, and the unanimity and vigor with which representatives of that State spoke in favor of the institution nearly carried the Association to the point of passing a resolution favoring their establishment in different States. It is evident, therefore, that whatever difficulties may exist they are not insurmountable. It is, we believe, a very encouraging sign when many thoughtful men representing a great interest have reached the conclusion that their own wellfare, as well as that of the public, is so nearly identical that they seek the protection and co-operation of the State from which they have derived their franchise. It is beginning to be recognized that State interference in private affairs is one thing, and that the regulation of the service of corporations created by the State and endowed by it with special privileges is quite another thing. We cannot but believe that the convictions of the managers of our railroad corporations will soon undergo a change in the direction in which the gas men have been progressing so rapidly of late.

Experiments on Flame.

The London *Journal* notes that in a recent number of *Nature* Mr. G. J. Burch published the results of some further experiments on flame, in continuation of those recorded in an earlier issue of that periodical. In his first article he showed that there are two classes of continuous spectra—viz., those due to an incandescent precipitate (in which case the flame has the power of reflecting and polarizing light), and, secondly, flames that do not possess any reflecting power, but give a soft continuous spectrum without maxima or minima. Of the second class is carbonic oxide, which gives at normal pressures a fairly bright spectrum, and at increased pressure—according to Dr. Frankland—a very bright continuous spectrum. Mr. Burch has recently observed its spectrum under reduced pressure, using for his purpose an apparatus similar to that described by Dr. Frankland in his "Experimental Researches." He had considerable difficulty at first in keeping the flame alight at anything like low pressures; and finally he adopted a glass jet, of a trumpet shape, increasing very gradually from 1 millimeter to 3 millimeters in diameter, the flame being further shielded from draughts by a wide disc of cork 10 mm. below the mouth of the jet.

Having carried out his experiment with carbonic oxide (which it is unnecessary to reproduce), he repeated Dr. Frankland's experiment of burning coal gas in air under reduced pressure. Dr. Frankland found that at 6 inches pressure the last trace of yellow disappears from the summit of the flame, leaving the latter an almost perfect globe of peculiar greenish-blue tint. But he used a jet contracted at the mouth to 1.5 mm. Mr. Burch, however, with his much wider trumpet-shaped jet, could, by turning on more gas, produce smoke at 160 mm., so as to blacken the glass chimney. At 120 millimeters the light was noticeably less vivid—the flame having a diluted appearance; but the spectrum showed the usual carbon lines much more sharply defined, the mantles being very much thicker than at normal pressure. With this exception there was no difference caused by the reduction of the pressure to 60 mm.; and even then on turning up the gas a little the ellipsoidal flame became pointed, and the yellow light, giving the incandescense spectrum, reappeared in the tip of it. Mr. Burch thinks it is evident that the trumpet-shaped jet allows carbon to be precipitated in the flame at much lower pressures than the contracted jet. One phenomenon observed by Dr. Frankland the writer was disappointed not to see. The Doctor says: "Just before the disappearance of the yellow portion of the flame there comes into view a splendid halo of pinkish light, forming a shell one-half inch thick around the blue-green nucleus. * * * The color of this luminous shell closely resembles that first noticed by Gassiot in the stratified electrical discharge passing through a nearly vacuous tube containing a minute trace of nitrogen." He does not speak of having used the spectroscope to determine the nature of this pink glow. Mr. Burch went considerably below the lowest pressure mentioned by Dr. Frankland—viz., 4.6 inches—but entirely failed to reproduce it. But he has noticed that very small flames from capillary tubes, observed under a power of 100 in the microscope, are sometimes tinged with rose color in the outer mantle, from a very faint trace of sodium orange light mingling with the blue of the soft outer mantle; and he thinks the jet used by the Doctor, or the glass chimney, may have been sufficiently heated to give a rosy tinge to the flame. Mr. Burch calls attention to one other point. The appearance of the gas flame at low pressures is, he says, precisely like that of a very small gas flame under the microscope. The inner mantle appears to be bordered with bright green light, due to the principal green band of the carbon spectrum extending slightly further than the others. Beyond this, again, comes a zone of violet light due to the band in the violet; and in most cases this extends nearly if not quite to the outer mantle. At ordinary pressures this can only be seen by means of a magnifying glass, except with a special burner;

but the *in vacuo* flame is, as it were, magnified as to its structure, which is thus visible to the naked eye. This fact, in Mr. Burch's opinion, suggests that flames may in a sense obey Boyle's law—*i. e.*, that the space required for complete combustion under given conditions varies inversely as the pressure. He is continuing his experiments, and therefore some further contributions to the general knowledge on this subject may be expected.

Useful Hints for Steam Users.

The *American Engineer* (and it is a pretty sound authority) says that the following figures were obtained from the notebook of an expert English engineer. That being so, users of steam would do well to keep them for handy reference, for investigation will prove that the results have been worked out with great accuracy and skill.

The facts will be found of use for ready reference in calculating the amount of fuel used, saved, or wasted by an engine or boiler in the usual working year of 300 days of ten hours each, and also in a working year of 300 days of twenty-four hours each, such as is the customary run of establishments working 144 hours per week. Each pound of coal per hour per horse power amounts in 300 ten-hour days to 1.33928 gross tons of 2,240 pounds each, and in 300 twenty-four-hour days to 3.21428 gross tons. Each half pound of coal per hour per horse power is 0.66964 gross ton per year of 300 twenty-four-hour days. Each quarter pound of coal per horse power is 0.23482 gross ton per year of 300 ten-hour days, or 0.80357 gross ton per 300 twenty-four-hour days. Each eighth pound of coal per hour per horse power is 0.16741 gross ton per year of 300 twenty-four-hour days. The gross ton of 2,240 pounds avoirdupois is given in these calculations.

To reduce gross tons of 2,240 pounds to net tons of 2,000 pounds, multiply by 1.12 or divide by 0.8928, whichever is more convenient, and conversely. To reduce net tons of 2,000 pounds to gross or legal tons of 2,240 pounds, divide by 1.12, or multiply by 0.8928, according to convenience. In the application of the foregoing figures, suppose a condensing steam engine to develop 175-horse power with 40 pounds initial pressure above atmosphere, with a coal consumption of 3¼ pounds per hour per horse power, and that by increasing the initial pressure to 50 pounds by the gauge, the work was 185-horse power, with a coal consumption of 2¾ pounds per hour per horse power, the saving per year of 300 ten-hour days is 0.66964 gross tons for each horse power, or 0.66964 = 126.2834 gross tons, and the saving per year of 300 twenty-four hour days is 160,714 by 185 = 297.32 gross tons.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Personal.—On first of January Mr. Geo. H. Cole was appointed General Agent of the Union Foundry and Pullman Car Wheel Works, with headquarters at the Pullman Building, Chicago, Ills. The appointment is a good one.

Gas Rates at Columbia, Pa.—Mr. Robt. Beacham, Superintendent of the Columbia Gas Light Company, writes us, under date of Jan. 6th, that the new schedule (it became operative on October 1st) gives great satisfaction. In accordance with its provisions the net rate to ordinary consumers was placed at $2 per thousand cubic feet. The bills, as before, are made out at $2.50, but prompt payment secures a rebate of 20 per cent. Prior to October, '85, ordinary consumers paid $2.75; between Oct., '85, and Oct., '86, they paid $2.25; now they are charged but $2—which scaling proves that Mr. Beacham's directors are inclined to move with the procession.

Washington (Pa.) also in Line.—Mr. Jno. C. Hastings, Secretary of the Washington Gas Company, informs us that, at a meeting of the Board of Directors, held Monday, Jan. 3d, the following net schedule of rates was adopted:

A monthly consumption of 900 cu. ft.....	$1.50	per M.
" " between 1,000 and 5,000 cu. ft.	1.20	"
" " upwards of 5,000 cu, ft.....	1.00	"

This schedule took effect on all accounts rendered on first instant. The prices charged during '86 appear to have been as follows: $1.50, $1.30, $1.20, and $1. The face of the new scale does not, of itself, show the real importance of the concession just granted; but that it is considerable will be understood when one remembers that the greater number of the Company's patrons must be included in the section embraced by or between the highest and lowest consumption allotments. Further, people who, on a monthly consumption of 5,000 cubic feet of gas, receive their supply in consideration of the payment of $1 per thousand, are getting it at a rate low enough in all conscience.

The Finance Committee of Philadelphia City Council says "No."—The second offer made by millionaire Wannamaker (it was decidedly more liberal than even was the first proposition made by him), added to the offer made by a Mr. Henry Bower, which also was exceedingly advantageous to the city, seem to have convinced the Councilmanic Finance Committee of the Quaker City that the gas plant was a pretty valuable thing for the Philadelphia taxpayers to retain control of, even if that control is in the nature of only a partial grasp. At any rate, the Committee, at a meeting held December 27th, decided to report back to Council that all the propositions submitted be rejected. This action may or may not be finally ratified, although the outlook seems to favor the "may" end of the proposition. At all events, Mr. Wannamaker is quite likely entitled to all the credit of having nipped in the bud the nicely-laid plans of the original conspirators, who evidently hoped to acquire, "on easy terms," a veritable bonanza whose content of riches would put to shame the gold and silver bearing lodes that not so many years ago caused the Comstock ledge to be regarded with wonder all over the civilized world. Perhaps, now that the dawn of reason appears to have manifested itself in the Philadelphia City Councils, we may have ground for hope that the Trust will, by means of needed and judicious expenditure on the Philadelphia gas works, place that plant in proper condition to meet the tremendous strain which not only the future but the present demands of its consumers have put upon it. If Philadelphia will but awake to the possibilities of the occasion she could speedily claim the possession and ownership of the leading gas plant of America, and no mean thing would it be to have the right to so say.

Named as Chief Engineer.—Mr. Wm. H. Bradley (to whose skill and fidelity, more than to those of any other single man, can the wonderful success of the former management of the Municipal Gas Company of this city be ascribed) was, on date of Jan. 1st, formally appointed Engineer-in-Chief of the Consolidated Gas Light Company. The word "formally" is used because it has long been an open secret that virtually Mr. Bradley was considered to be the Chief Engineer of the Company. To show what an enormous business is being done by the Consolidated Company we may mention that on more than one 24 hours this winter the aggregate sendout from two of its stations amounted to somewhat over 13 millions cubic feet. Mr. Bradley, it will therefore be seen, cannot be accused of having attained a sinecure's berth, and it goes without saying that, as in the past, his employers can count upon him for faithful, intelligent, and untiring effort.

Brother Egner and His Varying Emotions.—Mr. Frederic Egner, Supt. of the Laclede Gas Light Company, may be said to have recently experienced, and within unmistakably short compass, a remarkably thrilling series of emotions. The inciting cause or causes seem to have been something like the following: Last spring it will be remembered that the Laclede people, in common with many others of the fraternity, had a good deal of trouble at the hands of the strikers, and although Brother Egner speedily "knocked spots" out of his section of malcontents, the latter, while submitting then to the inevitable, warned the victors (meaning Egner more than anyone else) that they, the strikers, would have their revenge when the dark days of the winter season were at hand. December 31st was a pretty bad sort of day—for gas consumers—in St. Louis, and the Laclede's benches were all under fire. So, when the Superintendent saw a large body of his men drop their tools and start of to a particularly roomy section of the retort house, he naturally enough felt a cold chill run up underneath his ulster (the chill might, of course, be charged to the state of the thermometer, for at that time the mercury was busily engaged in an attempt to find a crack in the bottom of the bulb), and he at once, and in terror, recalled the threat of vengeance. One of the foremen was asked if the men were about to repeat the experiment of the spring season, and the foreman replied that he did not know. The Superintendent thought it best to at once hear the worst, and off he posted after the seeming strikers. Before catching up with them he was intercepted by a messenger from the office, who hurriedly said that Mr. Egner was wanted at once by the President of the Company, that gentlemen being anxiously waiting for him at headquarters. Now, indeed, the blow had fallen. There could no longer be any doubt, for as he turned to retrace his steps the malcontents followed suit. The Superintendent noted that many of the men had already assembled in the office, and the door had no sooner closed on him than it opened again to admit the delegation which had followed in his wake. Only one moment of suspense, and the cause of the assemblage was made plain. One of the clerks on the works stepped forward and in good, plain English informed Mr. Egner that the employes of the Laclede Company wished to show him what they thought of him; and after the speaker had painted that feeling through the medium of a few well-chosen words, he accentuated the painting by presenting Mr. Egner with a magnificent array of solid silverware, elegantly chased and appropriately inscribed. The set included a massive tray, on which reposed a complete breakfast and tea service. To say that the recipient was surprised is to put it in the mildest possible manner; but seemingly *sans peine* he accepted the altered conditions, and also accepted the gift in the spirit with which it was

offered. Now more than ever we may expect that Brother Egner, in common with the sage of earlier days, gives adherence to the prediction that no cloud, be it ever so dark, may be said not to carry within it a silver lining.

Cheaper Gas for Kingston, Canada.—We understand that on the 1st inst. the proprietors of the Kingston Gas Light Company authorized a reduction of 50 cents per thousand in the selling rates.

Judge Moran Hands Down a Decision.—A special to the New York city *Times*, dated Chicago, Ill., Jan. 6, contains the following: "A decision was filed to-day in the Appellate Court, by Judge Moran, in the case of the Peoples Gas Company against the Chicago Gas Light and Coke Company. This was a bill to restrain the Chicago Company from laying mains in the west division of the city in violation of a contract made between the two companies years ago, whereby they were not to invade each others territory. The Court below held that the contract was in violation of public policy, as tending to establish a monopoly, and dismissed the bill for lack of equity. Concerning the question of the legality of the contract referred to, the Appellate Court says in effect that as under its charter the Chicago Company was not limited in its field of operations, and was free to exercise its franchise in the west division if it saw fit, it was equally free not to exercise its franchise in that part of the city, and to contract not to so exercise. On the question of public policy the Court says that 'an agreement in general restraint of trade is contrary to public policy, but an agreement in partial or particular restraint is good when the consideration is good and the restrictions reasonable.' The decision is considered a remarkable one." The future proceedings in this case will be looked forward to by gas men with great interest, for a decidedly vital principle is involved in the suit.

A Burner Company.—The Mead Regenerative Gas Burner Company, to have its principal place of business located in this city, was chartered on Jan. 5. The capital is fixed at $250,000.

An Item from Lincoln, Ills.—Mr. S. A. Foley, of the Lincoln Gas and Electric Light Company, writes that he has made a contract with the city under the terms of which the Company binds itself to charge $20 per post per annum for street lights that are extinguished at 11:30 P.M.; $30 per post to be paid for lamps that burn all night. The Company is to light and extinguish, and the city agrees to pay a certain fixed sum toward the making of necessary repairs. The contract is to run for five years, and to begin with 1st inst. Mr. Foley adds that the Company enjoyed a prosperous year; and we cannot see how it could well be otherwise, for President Foley gives close and intelligent attention to its management.

Something from Ironton, Ohio.—Mr. W. W. Prichard, who controls the business management of the Ironton Gas Company's affairs, is meeting with that measure of success which comes to those who heed their opportunities. In a letter recently received by us from him Mr. Prichard says: "The sliding scale adopted here last March has given great satisfaction, both to the consumers and to the Company. The past year, against considerable prejudice, and in face of the fact that coal costs but six cents per bushel delivered, we decided to attempt to introduce gas cooking stoves. As an incentive we fixed the price of gas to those using gas cooking stoves at $1.80 per thousand cubic feet, a discount of 5 per cent. being granted in consideration of prompt payment. The rate applied to all gas that passed through one meter, from May 1 to November 1, but did not become operative unless 1,000 cubic feet was consumed in each 30 days. The success which attended the initial attempt was such that the directors subsequently decided to reduce the price for gas used in heating and cooking stoves, gas engines, and for all mechanical purposes, to $1.60 per thousand, with 5 per cent. off for prompt pay, the last rate going into effect on November 1. Comparing the monthly bills of consumers, from the time that they commenced to use the stoves, with the statement for the corresponding months of the previous year—most of the stoves were put in during July and August—the total gain for cooking stoves alone was shown to have been 51,900 cubic feet. Three gas engines and one tobacco sweater developed a gain of 18,200 cubic feet, or a total of 70,100 cubic feet for our first year's work. It took considerable effort on my part to induce our directors to permit me to try the gas stove business, and the President said if I could place 10 stoves he would be satisfied. A count snows that 22 cooking and 6 heating stoves, 2 gas engines, and one tobacco sweater had been installed up to December 16, 1886. The prospect seems good for 50 stoves, and additional gas engines, for next summer. Your readers may be interested to hear something further in the matter of our leakage account, as a supplement to the paper* read by me at the Springfield meeting of the Ohio Association. In first eleven months of 1886 we manufactured 46,920 cubic feet less than during the same period last year, but sold 417,028 cubic feet more. In connection with this our storekeepers, with the exception of the druggists, were seized with an early closing fit, and shut up their places of business at 7:30 P.M. Besides that the street or public lamp schedule was also decreased. Under such adverse circumstances we do not regret the reduction granted to consumers, and when everything is figured up there will be only a slight difference in net profit for the year. However, having everything about the plant in good working order naturally tends to lessen the cost of manufacture. We put in a bench of fours on the generator plan, with deep furnaces, in an old arch, and the result is that we can make more gas this winter in that bench of fours, assisted by a poor bench of fives (the latter will be abandoned in February), than we could last winter with the now poor bench of fives (it was new then), one bench of threes, and one bench of fours, both in fair order. We also have a greater quantity of coke to sell."

Mr. Prichard's practice could be imitated with profit by many others of the craft who are similarly situated. Ironton is not a particularly large town, and what was accomplished there can be done elsewhere. Of course, it may require the expenditure of some energy; but everyone who desires to succeed must expect to at least pay that price for success.

* See JOURNAL, May 17, 1886, page 983—"A Year's Experience in a Gas Works," by W. W. Prichard.

Change in Firm Name.—Mr. Henry Maurer, Proprietor of the Excelsior Fire Brick and Clay Retort Works, whose manufacturing plant is at Perth Amboy, N. J., and with sales headquarters at 420 East 23d street, this city, announces that his son has been admitted to a partnership in the firm. The title of the firm hereafter will be that of "Henry Maurer & Son."

At Rest.—We are called upon to chronicle the death of Mr. E. M. Van Kleeck, late President of the Poughkeepsie (N. Y.) Gas Light Company, whose demise occurred on Thursday, Jan. 6. Mr. Van Kleeck became President of the Poughkeepsie Company in 1878, and his administration of its affairs gave satisfaction to its owners. Deceased was in the 74th year of his age, and was a representative citizen of the city in which he dwelt. The funeral service was held on Sunday, Jan. 9.

One Day's Sendout at Poughkeepsie, N. Y.—For the 24 hours ended December 24th, 1886, the sendout of the Poughkeepsie Gas Light Company amounted to 106,000 cubic feet. That figure had not been exceeded since 1878.

New Gas Company.—The Pittsburg Gas Light and Coke Company, of Pittsburg, Kansas, has been chartered. It is officered as follows: President, O. T. Boaz; Vice-President, Frank Playter; Treasurer, F. W. Lanyon; Secretary, W. D. Ford. The Board of Managers invite the various firms engaged in gas works construction to communicate at once with them.

Holder for the Long Branch (N. J.) Gas Company.—Mr. T. F. Rowland, proprietor of the Continental Iron Works, Greenpoint, N. Y., is now engaged on the construction of a new gasholder for the Long Branch Gas Light Company. The holder is calculated to have storage capacity of 100,000 cubic feet, and will be suspended over or in a wrought iron tank. It will have six wrought iron columns, is calculated to give a maximum pressure of 3¼ inches, and will be finished by April 1st.

Mr. Glenn, of Cincinnati, Ohio.—We believe that Councilman Glenn, of Cincinnati, Ohio, ought to be "disciplined," for he certainly deserves "correction." Glenn was one of those who opposed the ordinance recently passed by the Cincinnati Council, in the nature of regulating rates to be charged by the Cincinnati Gas Light Company during the next ten years, and that opposition, of course, could not be objected to provided the objector adhered to the truth. Glenn originally urged that three gas companies in Chicago were charging only $1 per thousand cubic feet for gas supplied by them, and that statement was at once contradicted by General Hickenlooper. Glenn then wrote to Mr. Forstall, of the old Chicago Company, asking the latter to post him in the matter of current gas rates at Chicago. Mr. Forstall made the following reply:

"The net prices charged by the various gas companies in Chicago are as follows: Chicago Gas Light and Coke Company, $1; Consumers Company, $1; Peoples Company, $1.50; Hyde Park Company, $1.75; Lake View, $1.50; in South Chicago, $1.75. It must be borne in mind that the dollar rate in Chicago is a 'fighting price,' which has in two years brought one of the contestants into bankruptcy." If Glenn had any decency at all about him one would suppose that he would recant his former statement; but Glenn is not that sort of an opponent, for, in a letter of his published in the *Commercial Gazette*, at the time when he had Mr. Forstall's reply in his possession, he said: "I reassert and am prepared to prove my former statement that there are three companies in Chicago selling gas at a dollar per thousand cubic feet." In other words, he was prepared to reassert that which

he knew to be utterly false. There seems to be no difference in the makeup of a certain percentage of our city fathers, no matter where these exercise their "parental guardianship." New York, Buffalo, Brooklyn, Cincinnati—the "certain percentage," sooner or later, may be trusted to float to the surface.

FRISKY NATURAL GAS.—The Natural Gas developments have undoubtedly contributed greatly to the wealth of the country, but we have plenty of evidence that such development has been attended with injury to person and destruction of property. Perhaps the Kokomo affair, of December 17th, and the Youngstown explosion, of Jan. 5th, will serve to show what we refer to. Here are but two cases, yet we find that 35 persons were, according to the despatches, more or less injured at Kokomo, and that $100,000 will not cover the monetary loss sustained at Youngstown. Two lives lost must also be charged to the latter happening.

THE BROOKLYN (N. Y.) ELECTRIC LIGHT CONTROLLERS.—At a meeting of the stockholders of the Citizens Electric Light Company (held January 5th) Messrs. Chas. Cooper, Jno. Delmar, Anthony Barrett, Hugh McLaughlin, and T. F. Nevins were selected as a Board of Directors for the ensuing year. After looking over that list it is not hard to understand why the light of the future blazes out in solitary grandeur on the lone hilltops of the Park slope, over the odorous piggeries of the "Hook," and the classic precincts of the sections known by divers national appellations. Edison made a mistake (that is, if his remarks were intended to apply to Brooklyn along with the rest of the world) when he said that "electricity was the light of the rich," for the Brooklyn magnates, with an impartiality quite foreign to their practice in other respects, have decided that rich and poor must bask alike in the glare of the arc. In the meantime the ring receives $182.50 per annum for each 1,000-candle power lamp maintained, and it may be added that rich and poor have an opportunity to pay the bills. Some of those who ought to know whereof they speak assert that a Grand Jury of the future will be called upon to investigate certain items connected with the electric lighting of the City of Churches. It won't do any good, however; for the metal out of which the ring is composed becomes heavier and stronger with the lapse of time. All Brooklyn's taxpayers seem to be able to do is to watch and wait, and the trouble seems to be that they will never understand the inutility of such a process. The ringsters thoroughly appreciate the situation, and how deftly they take advantage of it.

GOING AHEAD.—Last December the Concord (N. H.) Gas Light Company sold 2,724,000 cubic feet of gas, or 170,000 cubic feet in excess of the returns for December, 1885. The Concord folks are about to add an electric plant to the existing gas works.

PRICE OF GAS AT BRUNSWICK, GA.—Gas is now sold in Brunswick for $2.50 per thousand. The Company will do better than that before long.

STREET LIGHTING AT BAYONNE, N. J.—At a meeting of the Bayonne Common Council (held Jan. 4th) a resolution was adopted to instruct the City Attorney to draft a contract with the United Gas Improvement Company—which now controls the Bayonne and Greenville Gas Light Company—of Philadelphia, Pa., to light 525 street lamps, at $20 per annum each. This is said to be a reduction of $5 per post from the rate formerly charged. The Improvement Company agrees to furnish a gas having 22-candle power.

TO ABANDON WATER GAS.—The Rochester *Post-Express* says that the manufacture of water gas at the works of the Clyde (N. Y.) Gas Company is to be abandoned.

GAS COMPANIES BIDDING FOR WHAT IS LEFT.—During the last week in December the City Works Commissioner, of Brooklyn, N. Y., opened the bids submitted by the local gas companies for lighting the streets in 1887—that is, for such portion of the lighting as will remain when the "ring" electricians are awarded their share:

Company.	Per post.
Citizens	$22.00
Williamsburg	21.75
Peoples	22.00
Metropolitan	22.00
Nassau	22.00
Brooklyn	19.80

These figures are about (if not quite) the same as those handed in a twelvemonth ago. If anything (except in case of the Brooklyn Company) the figures are too high for the duty exacted.

TO COMPEL A REDUCTION.—The legislators at Albany seem determined to ruin one or two of the Brooklyn gas companies, for that event is sure to take place—at least so we are told—if the bill already introduced, which seeks to limit the price to be charged to $1.50 per thousand cubic feet, be enacted into law. The nominal rate at present is $2 per thousand.

TO LIGHT THEIR ROADWAY.—The ordinance granting the L., C. & D. Railroad the right to run through Hamilton, Ohio, contains a clause which obliges the road to erect lamp posts and light with gas that portion of the road within the city limits. Wherever possible every railroad corporation in the country ought to be made to do likewise.

PROPOSAL TO ESTABLISH A GAS WORKS.—Ohio parties (names at present unknown to us) made a proposition to the City Council of Lamar, Mo., on the evening of Jan. 3d, to erect and maintain a gas plant in that town provided the authorities would agree to maintain 40 lamp posts, and pay therefor the sum of $30 each per annum; and further provided that the applicants be granted an exclusive privilege for 30 years. The matter will be decided this evening. Lamar is the capital seat of Barton County, Mo., on or near Spring river, and is about 38 miles southeast of Fort Scott, Kansas. It has a population something short of 4,000.

EATON'S EXPERIENCE.—Eaton, Ohio, attempted to illuminate her streets by means of two tower and four separate arc lights, suspended over the four principal crossings of the town. The current was turned on with dusk of Christmas eve., and one who witnessed the attempt said that the place, which is quite small, was better lighted when gasoline alone was used, and the latter plan cost $400 a year less than the present system will.

ADDRESS CHANGED.—Prof. Henry Wurtz has removed his offices and laboratory from 333 Second avenue, to 2,142 Seventh avenue, this city. The new location is close by the 125th street station of the West side elevated system.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—The annual meeting of this Society will be held, on January 19 and 20, at the Society's House, No. 127 East Twenty-third street. Among the other items on the programme for the second day we note that a visit is to be made to Mr. Thos. F. Rowland's Continental Iron Works.

WHAT COLLECTOR MAGONE THINKS OF THE ELECTRIC LIGHT.—The *Commercial Advertiser* has been making some pertinent inquiries concerning the worth and cost of practical electric lighting as witnessed in the metropolis. One of its reporters returns Collector Magone as saying of the incandescent electric light supplied to the Custom House by the United States Company: "The electric lights in my offices are worthless, and I have reported their worthlessness to the Treasury authorities at Washington. If it were not that we have gas fixtures as well we would be in darkness the greater part of the time when we need artificial light. My Secretary is obliged to use candles on his desk." The United States Company maintains 209 incandescent lamps in the Custom House buildings, and the Government pays therefor the sum of $400 per month.

DECATUR, Alabama, it is said will shortly construct gas and water works.

THE Sheffield (Alabama) Land, Iron and Coal Company asks that builders of gas works communicate with it in reference to the erection of a gas plant at Sheffield.

TO BUILD THE LOWELL (MASS.) HOLDER.—In the competition for the new holder to be erected on the works of the Lowell Gas Light Company the plans and specifications submitted by Messrs. Bartlett, Hayward & Co., of Baltimore, Md., were accepted, and the contract subsequently awarded them. The holder is to have a diameter of 130 feet in outer section, two 30-foot lifts, and a 12-column (wrought iron) suspension frame, with an intermediate belt of latticed girders.

NAMED AS GENERAL MANAGER.—Mr. M. S. Greenough has been appointed General Manager of the American Gas Company, of Phila., Pa. We congratulate the Company on the selection made. Bright, skilful, and the soul of honor, Mr. Greenough will certainly prove a veritable tower of strength to the Company.

SECRETARY BUTTERWORTH'S LIST.—Secretary Butterworth proposes the following list as subjects likely to add interest to the March meeting of the Ohio Association: What are the Advantages of Anti-Seal Appliances for Dip-Pipes in Hydraulic Mains? Will Iron Purification Increase or Diminish Troubles Caused by Naphthaline? Temperature of Retorts; What Amount of Capital per Thousand Feet of Gas put into Holders is Invested in Ohio Gas Works? Photometric Tests of Candle Power; Choked Stand-Pipes—Is there a Remedy? Testing Consumers' Meters; Purification in Small Works; Relative Cost of Coal Gas and Water Gas; The Elimination of Tar Before Gas Reaches the Washer; What is the Proper Location for the Exhauster? Condensation; Cause and Prevention of Stoppage in Burner Tips; Uniform vs. Special Rates for Gas.

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MONDAY, JANUARY 17, 1887.

The Market for Gas Securities.

The market for city shares at present writing is decidedly uneven. Consolidated shows a sharp advance over last quotation given in these columns. Within the fortnight top price was reached at something short of 83, but subsequent reaction forced the shares down to 80, and from thence a rising tide restored quotations to between 81 and 81¼. Equitable is lower, at 112 asked, which is one point below former bid price, although it should be remembered that these shares are now ex-dividend of 2 per cent., paid Saturday last. Mutual is weak, despite the payment of a 2 per cent. dividend on 10th inst. At auction, we note sale of 70 shares Mutual, at 100, and $3,000 bonds, at 102½. On last Wednesday the Harlem station of the Consolidated was put once more in duty, and although it is claimed that the excessive demand for gas in that section necessitated the process of revival such statement must be taken with a grain or two of salt. The Company managed to get along without assistance from the Harlem branch during the period of heaviest winter output, and putting one thing with another, perhaps the scarcity and dearness of anthracite coal in this vicinity made possible by the lunacy of those grimy sons of toil—the "coal handlers" of New Jersey—about accounts for the present "color" in the Harlem benches. Whether excessive demand or dear anthracite may be chosen to account for the Harlem departure, investors may be certain that Consolidated gas shares are worth more than ruling figures. Brooklyn shares are looking up a bit, and 'tis likely that the scare over them is most ended. At the annual election of the old Brooklyn Company, held Jan. 11th, no change was made in the executive management. The *Globe-Democrat*, St. Louis, Mo. (issue of Jan. 10, 1887), contains a rabid bear article directed to local gas stocks. Eastern holders of Laclede shares, and there are many of them, need entertain no fear of the ultimate result, should a gas war break out in that locality. The Laclede Company will more than hold its own every time. To go back to Brooklyn, the feeling there seems to be now that Senator Griswold's Albany proposition to oblige the Brooklyn Companies to charge not to exceed $1.50 per thousand cubic feet for gas is likely to fall short of becoming a law. Why this sentiment prevails can hardly be explained on any better ground than that our legislators, having killed the Metropolitan golden gas goose, will be cautious how they put the knife into the punier Brooklyn waddler.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 WALL ST., NEW YORK CITY.

JANUARY 17.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	81½	81¾
Central	440,000	50	—	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	110	112
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	113
Mutual	3,500,000	100	97x	—
" Bonds	1,500,000	1000	101	—
Municipal, Bonds	750,000		—	—
Northern	125,000	50	36	—
" Scrip	108,000			
Yonkers		50	51	55
Richmond Co., S. I.	300,000	50	50	—
" Bonds	40,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	102	103
Citizens	1,200,000	20	—	57
" S. F. Bonds	320,000	1000	—	103
Fulton Municipal	3,000,000	100	—	130x
" Bonds	300,000		—	106
Peoples	1,000,000	10	57	—
" Bonds	290,000	—	100	—
" "	250,000	—	99	—
Metropolitan	1,000,000	100	—	75
Nassau	1,000,000	25	100	—
" Ctfs	700,000	1000	100	—
Williamsburgh	1,000,000	50	115	—
" Bonds	1,000,000	—	107	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	90	95
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	130	138
" " Bonds	124,000	—	105	110
Chicago Gas Co., Ills	5,000,0000	25	142	145
Peoples G. L. & C. Co., Chicago, Ills	3,000,000		29	31
Cincinnati G. & C. Co.			198	200
Consolidated, Balt.	6,000,000	100	55	57
" Bonds	3,600,000		107	107½
Chesapeake, Balt.	1,500,000	100	71	73
"	1,000,000		100	102
Central, S. F., Cal.			82½	84
Capital, Sacramento, Cal.			54	56
Consumers, Toronto	1,000,000	50	194½	196½
Hartford, Conn	750,000	25	140	142
Jersey City	750,000	20	155	—
Laclede, St. Louis, Mo.	1,600,000	100	110	112
Louisville, Ky	1,500,000	50	126	130
Little Falls, N. Y.	50,000	100	95	100
" Bonds	25,000	—	100	103
Montreal, Canada	2,000,000	100	209	215
New Haven, Conn		25	190	195
Oakland, Cal.			35	36
Peoples, Jersey City		—	25	30
" " Bonds			—	—
Paterson, N. J		25	90	—
Rochester, N. Y.		50	75	80
St. Louis, Missouri	600,000	50	—	475
San Francisco Gas Co. San Francisco, Cal.	10,000,000	100	60¼	60½
Memphis (Tenn.) Gas	750,000	100	80	82
" Bonds	240,000	100	103	—
Washington, D. C.	2,000,000	20	190	—
Wilmington, Del.		50	205	215
Havana (Cuba) Gas Co.	3,000,000	100	18	20
" Bonds	550,000		102	—

Advertisers Index.

GAS ENGINEERS. Page

Jos. R. Thomas, New York City ... 56
Wm. Henry White, New York City ... 56
Wm. Farmer, New York City ... 56
William Gardner, Pittsburgh, Pa ... 56

GAS WORKS APPARATUS AND CONSTRUCTION.

James R. Floyd, New York City ... 59
T. F. Rowland, Greenpoint, L. I ... 59
Deily & Fowler, Phila., Pa ... 59
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 59
Stacey Mfg. Co., Cincinnati, Ohio ... 59
Bartlett, Hayward & Co., Baltimore, Md ... 59
Morris, Tasker & Co., Limited, Phila., Pa ... 58
Davis & Farnum Mfg. Co., Waltham, Mass ... 16
R. D. Wood & Co., Phila., Pa ... 58
Southwark Foundry and Machine Co., Philadelphia, Pa ... 58

PROCESSES.

National Gas Light and Fuel Co., Chicago, Ills ... 48
American Gas Improvement Co., Pittsburgh, Pa ... 47

GAS AND WATER PIPES.

Gloucester Iron Works, Phila., Pa ... 56
Warren Foundry and Machine Co., Phillipsburgh, N. J ... 56
Mellert Foundry and Machine Co., Reading, Pa ... 56
Cincinnati and Newport Iron and Pipe Co., Newport, Ky ... 56
Ohio Pipe Co., Columbus, Ohio ... 56
Pancoast & Rogers, New York City ... 56
M. J. Drummond, New York City ... 56

GAS ENGINES.

Schleicher, Schumm & Co., Phila., Pa ... 64
Clerk Gas Engine Co., Phila., Pa ... 50

RETORTS AND FIRE BRICK.

J. H. Gautier & Co., Jersey City, N. J ... 54
B. Kreischer & Sons, New York City ... 54
Adam Weber, New York City ... 54
Laclede Fire Brick Works, St. Louis, Mo ... 54
Brooklyn Retort and Fire Brick Works, Brooklyn, N. Y ... 54
Borgner & O'Brien, Phila., Pa ... 54
James Gardner, jr., Pittsburgh, Pa ... 54
Henry Maurer & Son, New York city ... 54
Chicago Retort and Fire Brick Works, Chicago, Ills ... 54
Baltimore Retort and Fire Brick Co., Baltimore ... 54
Oakhill Gas Retort and Fire Brick Co., St. Louis, Mo ... 54
Evens & Howard, St. Louis, Mo ... 55
Cincinnati Gas Retort and Fire Brick Works, Cincinnati, O. 55
Emil Lenz, New York City ... 55

SCRUBBERS AND CONDENSERS.

G. Shepard Page, New York City ... 57

REGENERATIVE FURNACES.

Adam Weber, New York City ... 55
Bartlett, Hayward & Co., Baltimore, Md ... 55

GAS GOVERNORS.

Connelly & Co., New York City ... 51
T. C. Hopper, Phila., Pa ... 52

CEMENTS.

C. L. Gemould, Manchester, N. H ... 47
Howard Fleming, New York City ... 48

GAS ENRICHERS.

Forest City Naptha Co., Cleveland, Ohio ... 60

GAS METERS.

Harris, Griffin & Co., Phila., Pa ... 62
American Meter Co., New York and Philadelphia ... 63
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa ... 63
Helme & McIlhenny, Phila., Pa ... 63
D. McDonald & Co. Albany, N. Y ... 63
Nathaniel Tufts, Boston, Mass ... 62

EXHAUSTERS.

P. H. & F. M. Roots, Connersville, Ind ... 52
Smith & Sayre Manufacturing Co., New York City ... 58
Wilbraham Bros., Philadelphia, Pa ... 60
Connelly & Co., New York City ... 52

GAS COALS.

Penn Gas Coal Co., Phila., Pa ... 61
Perkins & Co., New York City ... 60
Newburgh Orrel Coal Co., Baltimore Md ... 61
Despard Coal Co., Baltimore, Md ... 61
Chesapeake and Ohio R.R. Coal Agency, N. Y. City ... 61
Westmoreland Coal Company, Phila., Pa ... 61
Monongahela & Peters Creek Gas Coal Co., Pittsburgh, Pa ... 61

CANNEL COALS.

Perkins & Co., New York City ... 60
J. & W. Wood, New York City ... 60

VALVES.

Ludlow Valve Manufacturing Co., Troy, N. Y ... 52
John McLean, New York City ... 52

ENGINES AND BOILERS.

Jarvis Engineering Co., Boston, Mass ... 47

PURIFYING MATERIAL.

S. H. Douglas, Ann Arbor, Mich ... 47

GAS LAMPS.

The Siemens-Lungren Co., Philadelphia, Pa..... 57
G. Shepard Page, New York City..... 23
Albo-Carbon Light Co., Newark, N. J..... 49
Crystal Carbon Light Co., Phila., Pa..... 50
Standard Gas Lamp Co., Phila., Pa..... 48
Geo. H. Gregory, New York City..... 48

PURIFIER SCREENS.

John Cabot, New York City..... 47

GAS STOVES.

American Meter Co., New York and Philadelphia..... 53
The Goodwin Gas Stove and Meter Co., Phila. Pa..... 32

STREET LAMPS.

J. G. Miner, Morrisania, New York City..... 47
Bartlett Street Lamp Mf'g Co., New York City..... 52

BURNERS.

G. Gefrorer, Phila., Pa..... 60

STEAM BLOWER FOR BURNING BREESE.

H. E. Parson, New York City..... 55

GASHOLDER TANKS.

W. C. Whyte, New York City..... 48

GAS FIXTURES.

Mitchell, Vance & Co., New York City..... 48

STEAM PUMPS.

A. S. Cameron Steam Pump Works, N. Y. City..... 55

COKE CRUSHER.

C. M. Keller, Columbus, Ind..... 61
B. J. Allen. Newark, New Jersey..... 61

COAL HANDLING MACHINERY.

C. W. Hunt Company, New York City..... 52

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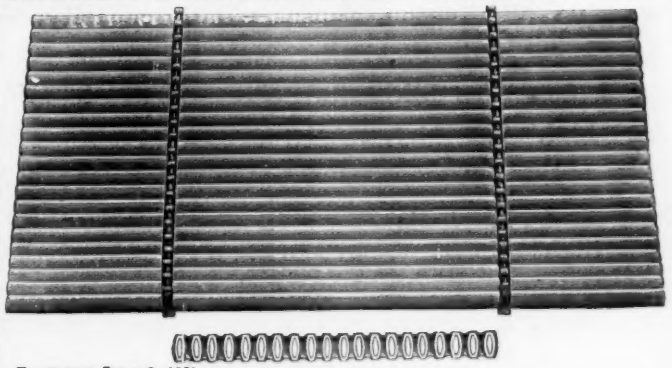

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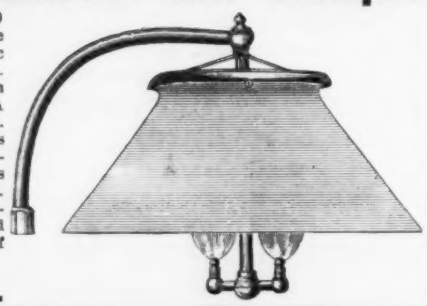
Manufactured under Patents granted and applied for. Over 20,000 sold in New York and Brooklyn. Over 100,000 sold in the U. S. in one year. It is the only lamp that can compete with Incandescent Electric Light. Gas Companies should see that it is on sale in their city or town. They can be attached to any bracket or fixture. **A Complete Revolution in Gas Lighting.** The invention of GEO. H. GREGORY, Gas Expert. A pure white light obtained from Gas, which is **Superior to Electric Light.** All lamps are finished in nickel plate. The construction of all lamps allows the gas to be superheated before passing through the tip, rendering the illuminating properties of the gas incandescent, which causes the **Brightest Light ever obtained from Gas.** Lamps made in all sizes. Gas Companies should assist in introducing this new lamp, which exceeds all other devices for gas lighting. This Cut represents Office and Bracket Lamp. Price, **$18 per dozen**; discount 50 per cent. in half dozen lots or more. Send for Catalogue. Address



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NATIONAL GAS LIGHT AND FUEL CO.

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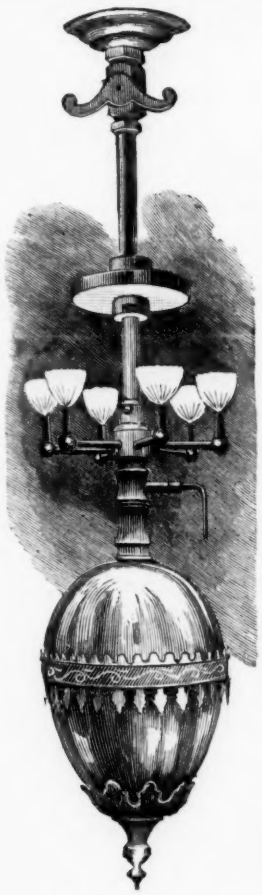
Have Erected Twelve Sets of Water Gas Generating Apparatus under the *Springer Cupola* System. They are as follows:

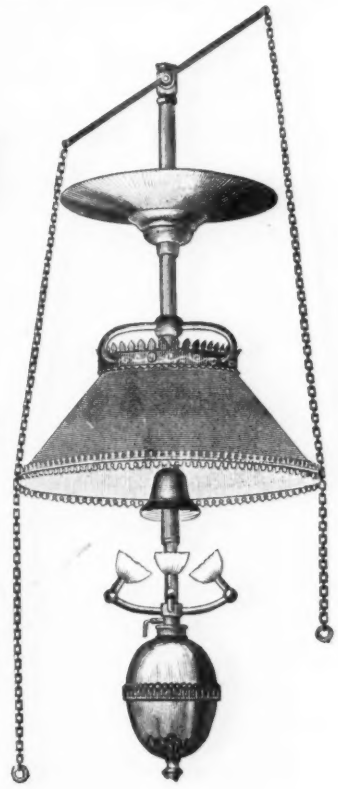
1886

Newton Illuminating Company, Newton, Kansas.— Daily capacity, 120,000 cu. ft.
Wellington Light & Heat Co., Wellington, Kansas.— Daily capacity, 120,000 cu. ft.
Chippewa Falls, Gas Light Co., Chippewa Falls, Wis.— Daily capacity, 120,000 cu. ft.
Elkhart Gas Light & Coke Co., Elkhart, Indiana.— Daily capacity, 120,000 cu. ft.
Madison City Gas Light Company, Madison, Wis.— Daily capacity, 120,000 cu. ft.
South Bend Gas Light Co., South Bend, Indiana.— Daily capacity, 250,000 cu. ft.
Sheboygan National Gas Comp'y, Sheboygan, Wis.— Daily capacity, 120,000 cu. ft.
Salina Gas Light Company, Salina, Kansas.— Daily capacity, 120,000 cu. ft.
Rathbun Company, Deseronto, Province Ontario.— Daily capacity, 80,000 cu. ft.
Jefferson City Gas Light Co., Jefferson City, Mo.— Daily capacity, 120,000 cu. ft.
Mankato Gas Light Company, Mankato, Minnesota.— Daily capacity, 80,000 cu. ft.
Minneapolis Gas Lt. & Coke Co., Minneapolis, Minn.— Daily capacity, 1,000,000 cu. ft.

1886



THE ALBO-CARBON LIGHT.



This most successful of all methods of enriching gas is based on the use of heated gas to vaporize a solid hydrocarbon, thus

COMBINING THE ADVANTAGES OF PREHEATING AND CARBURETTING.

The incoming gas passes over an extended heating surface (heated by means of the illuminating flames), and is raised to the temperature necessary to vaporize the carburetting material, which is a white, crystalline solid prepared from coal tar.

INJUNCTION GRANTED!

In the suit between this Company as complainant and Newman A. Ransom and the Chicago Gas Apparatus Manufacturing Company as defendants, pending in the Circuit Court of the United States for the Northern District of Illinois, on a late hearing of said cause before his Honor, Judge Gresham, Judge of said Court, an order was made and entered therein, a copy of which is hereto annexed, supporting our charge of infringement of our Letters Patent No. 247,925, dated Oct. 4, 1881, and of our Letters Patent No. 333,862, dated Jan. 5, 1886, and sustaining our rights under said several Letters Patent, to which especial attention is hereby directed, viz.:

UNITED STATES CIRCUIT COURT,

Northern District of Illinois.

WALTER J. KIDD
vs.
CHICAGO GAS APPARATUS MANUFACTURING COMPANY AND NEWMAN A. RANSOM.
} *In Equity.*

The Bill of Complaint and the affidavits filed by the respective parties having been read and the arguments of the counsel for the respective parties having been heard and duly considered by the Court—C. K. Offield, Esq., of Offield, Towle & Phelps, for the Complainant, and John H. Whipple, Esq., of Merriam & Whipple, for the defendants—and it appearing that Letters Patent of the United States were issued in due form of law to Joshua Kidd, No. 247,925, dated October 4, 1881, for an Improvement in Apparatus for Enriching Gas, also Letters Patent of the United States to said Joshua Kidd No. 333,862, dated January 5, 1886, for an Improvement in Carburetting Attachments for Gas Fixtures, and that the title to said Letters Patent vests by mesne assignments in the complainant herein; and it appearing by the answer of the defendant corporation, the Chicago Gas Apparatus Manufacturing Company, that they have never manufactured, used, or sold, or had anything whatever to do with any so-called apparatus for enriching gas of any kind or description whatever, or any carburetting attachment for gas fixtures of any kind or description whatsoever; and it appearing that said defendant, Newman A. Ransom, has infringed the second claim of said Letters Patent No. 247,925, dated October 4, 1881, and the first and second claims of said Letters Patent No. 333,862, dated January 5, 1886, by manufacturing and selling carburetting attachments for gas fixtures manufactured according to said Letters Patent contrary to the form of the statute in such case made and provided;

Now, therefore, it is hereby ordered, adjudged, and decreed, this 30th day of December, A. D. 1886, that an injunction be issued pursuant to the prayer of the Bill herein, strictly commanding and enjoining the said defendant, Newman A. Ransom, his clerks, attorneys, agents, servants, and workmen that they forthwith, and until the further order, judgment, and decree of this Court, desist from the making, using, or selling of any carburetting attachments for gas fixtures substantially as described and claimed in said Letters Patent in said above identified claims thereof; and that the complainant enter into Bond to be approved by the Clerk of said Court in the penal sum of two thousand dollars ($2,000), to said defendant, Newman A. Ransom, conditioned to pay the defendant or his legal representative all such costs and damages as shall be awarded against the complainant in case the said injunction shall be dissolved, said Bond to be filed on or before the 22d day of January, 1887.

and our suit against W. S. Horry (trading as the Crystal Carbon Light Co.), Arthur Kitson (trading as Kitson & Co.), and others, defendants, for infringement of our Letters Patent above mentioned and referred to, pending in the Circuit Court of the United States for the Eastern District of Pennsylvania, has not yet been reached for hearing.

THE ALBO-CARBON LIGHT COMPANY, - - - NEWARK, N. J.,

Sole Manufacturers for the United States.

GAS ENGINES. GAS ENGINES. BOOKS.

THE CLERK GAS ENGINE CO.,

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WM. W. GOODWIN, Prest. E. STEIN, Sec. S. LEWIS JONES, Asst. Sec. A. J. DOTY, Supt.

The utility and convenience of the Gas Engine being no longer an open question, it only remains now for intending purchasers to select the BEST. We claim for the CLERK GAS ENGINE that it is equal to any other manufactured as regards steadiness in running, simplicity, and ease of keeping in repair, and that it gives the greatest amount of power for the least money (both in first cost and expense of running) of any engine made. In support of this claim we refer to the test of the Gas Engines made under the direction of the American Institute of New York, in December, 1885, and heretofore published in these columns. These engines are especially adapted for continuous running under heavy loads, and we can refer to Engines which have run 22 hours a day for months at a time.

Made in Sizes of 5, 10, 15, 20, and 25 Horse Power. All Engines Guaranteed for One Year.

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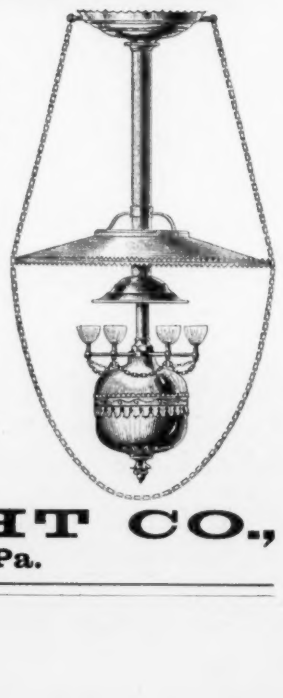
ADAPTED FOR PRIVATE RESIDENCES, CHURCHES, THEATERS, STORES, ETC.

These Burners are manufactured on the principle of enriching gas by means of Naphtheline (so-called Crystal Carbon or Albo-Carbon), the invention of the Rev. W. R. Bowditch, F.R.S., of Wakefield, England, who was the original inventor and patentee of this system of gas lighting.



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Many Gas Companies find the Crystal Carbon Light a valuable competitor against the Electric Light. It is ornamental, free from the defects common to all other enriching gas burners, and is as cheap as ordinary gas chandeliers. We sell direct to gas companies, giving them the benefit of agents' discounts.

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Gas Companies can have their own imprint placed on cover without extra charge. All orders to be sent to

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CONNELLY'S

AUTOMATIC GOVERNOR FOR STREET MAINS.

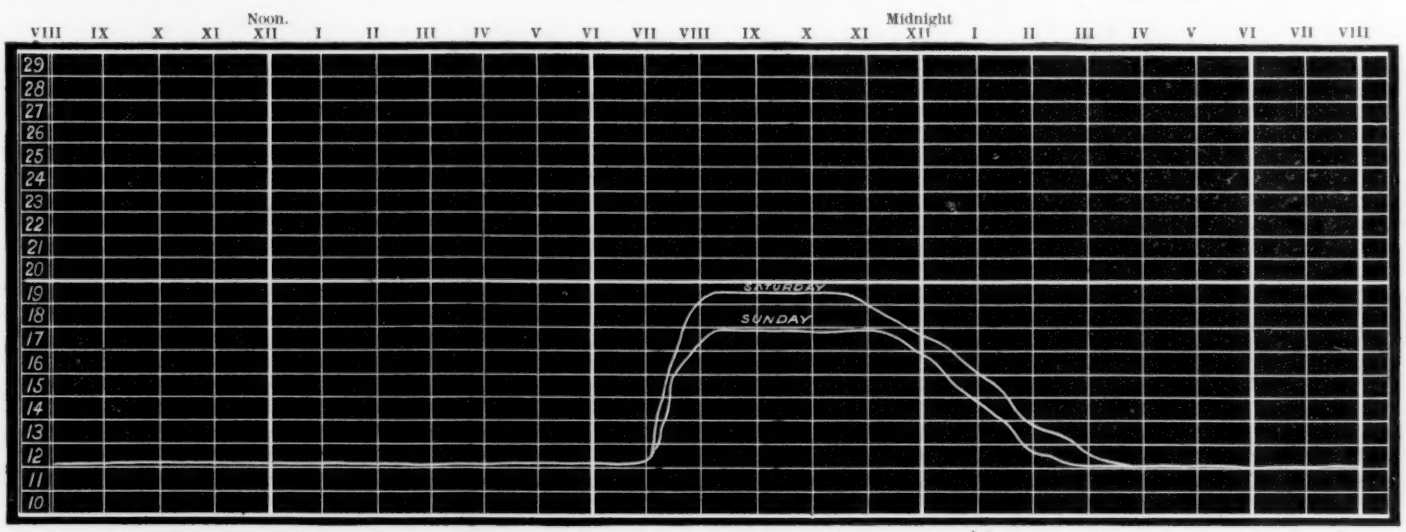
We invite the attention of all practical Gas Managers to the following letter and accompanying cut. The two lines show the pressure held by the Governor on Saturday and Sunday, and clearly illustrates the accuracy of the Governor in *increasing* and *reducing* pressure *in proportion to the volume of gas consumed.*

A Governor that puts the increased pressure on at "one fell swoop" and takes it off in like manner is *not* an "Automatic" Governor; and the circulation of pressure sheets showing such action by a so-called "Automatic" Governor is a rather amusing reflection on the intelligence of Gas Managers.

Strictly speaking, a "Balanced" Governor is an "Automatic" one, as it automatically varies the volume of gas sent out to *maintain a uniform pressure* at its outlet. But, as now applied, the term "Automatic Governor" is understood to mean a Governor that will *maintain pressure between any two desired extremes, in direct proportion to the volume of gas consumed.* Therefore pressure sheets showing *instantaneous changes* from maximum to minimum and *vice versa*, circulated broadcast as the record of an "Automatic (?) Governor," reveals inexcusable ignorance of the subject, amusing to many, yet liable to mislead the inexperienced novice.

We would suggest that all Gas Companies contemplating the placing of *Automatic* Governors would consult their own interests and avoid annoying experience by adopting a Governor *that has a record.*

CONNELLY & CO., LTD., 177 Broadway, N. Y.


Noon.
Midnight
VIII IX X XI XII I II III IV V VI VII VIII IX X XI XII I II III IV V VI VII VIII
29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10
SATURDAY
SUNDAY

Card Showing Pressure at the Milwaukee Gas Works, Saturday, July 10, and Sunday, July 11 1886.

MILWAUKEE, WIS., August 3d, 1886.

MESSRS. CONNELLY & CO., LTD., 177 Broadway, New York:

Gentlemen—Replying to yours of 29th, I send you a little package of register sheets. When your Governor (20-inch) was set I adjusted it to give 13-tenths day pressure and 22-tenths night pressure. Saturday nights it would run up to 25-tenths. Whenever it would cloud up in the daytime it would go up at first indication of darkness to about 15-tenths. I hunted back in the sheets to find one when pressure was increased in the daytime, but it is so long since we have had a stormy day I could not find one. You can, however, see a *slight change* on sheets for June 1 and June 25. You will see, too, that lately the Governor only puts on *about* 20-*tenths maximum pressure.* This is because *less gas is burned than when it was adjusted.* We have no complaints of pressure, and everyone appears satisfied. In conclusion, can say the Governor has *never been touched* since it was first adjusted, and has at all times *done just the work we wished it to do.* Very truly yours, E. G COWDERY, Engr. & Supt.

T. C. HOPPER'S
AUTOMATIC DIFFERENTIAL GAS GOVERNOR

Is now in Practical Operation, doing Perfect Automatic Service with Great Precision.

This Governor will do all and more than any other Governor on the Market.

BE SURE TO THOROUGHLY INVESTICATE THE SUPERIOR MERITS OF THIS GOVERNOR BEFORE PURCHASING.

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G. S. COOK, Pres. THOS. DAVENPORT (late Davenport Bros.), Sec. & Treas

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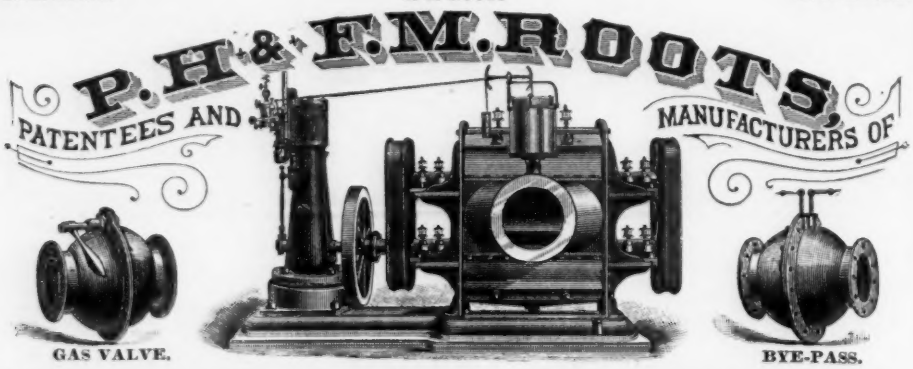

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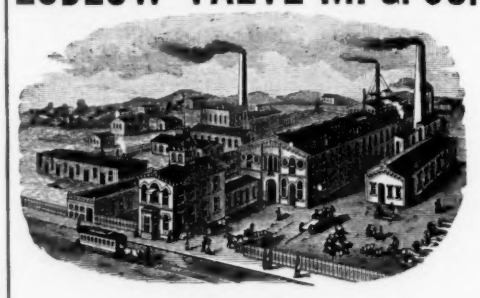

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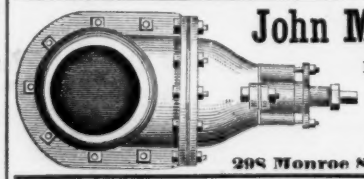

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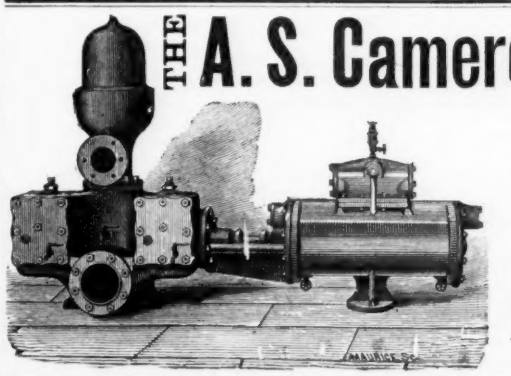

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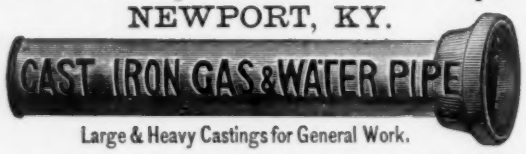

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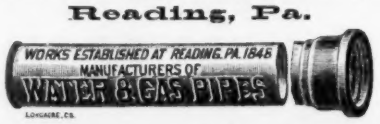

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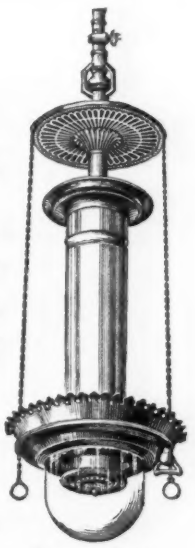

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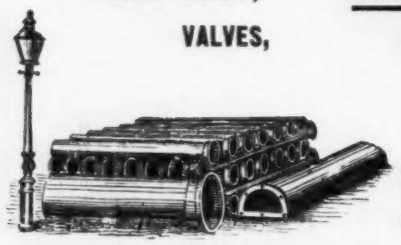

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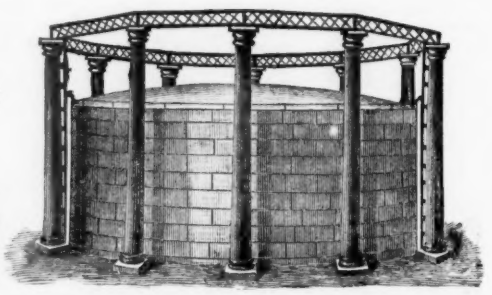

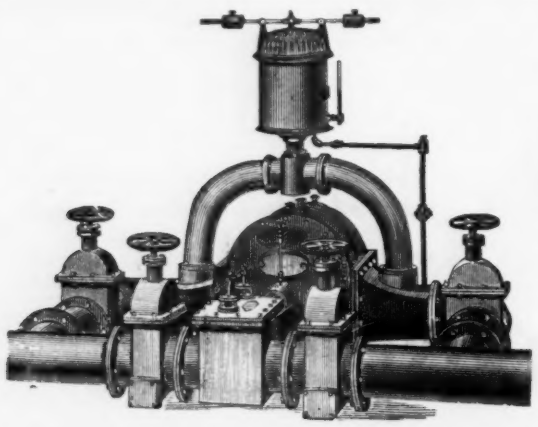

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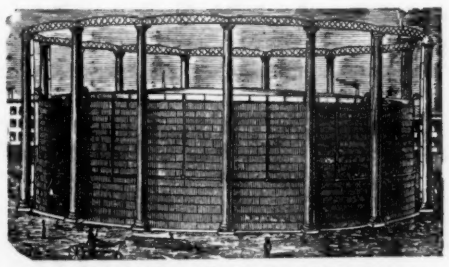

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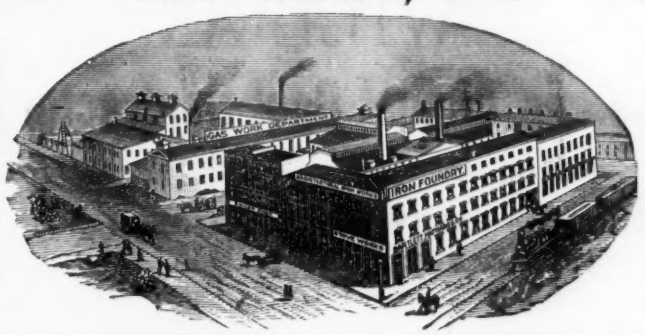

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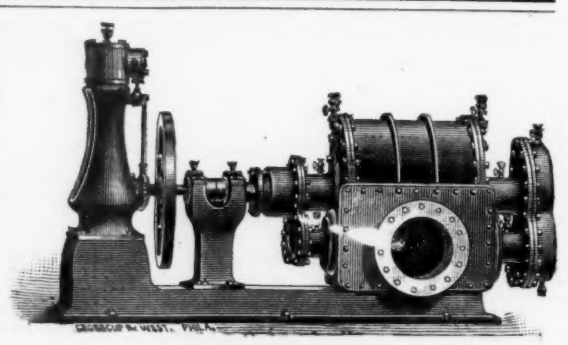

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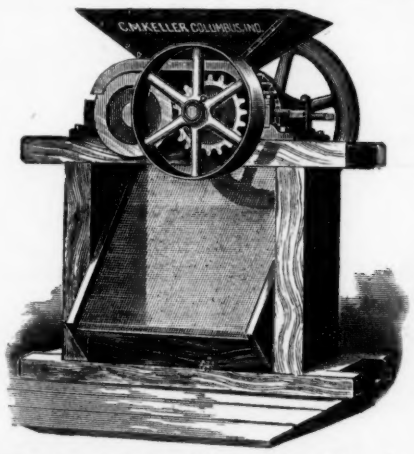

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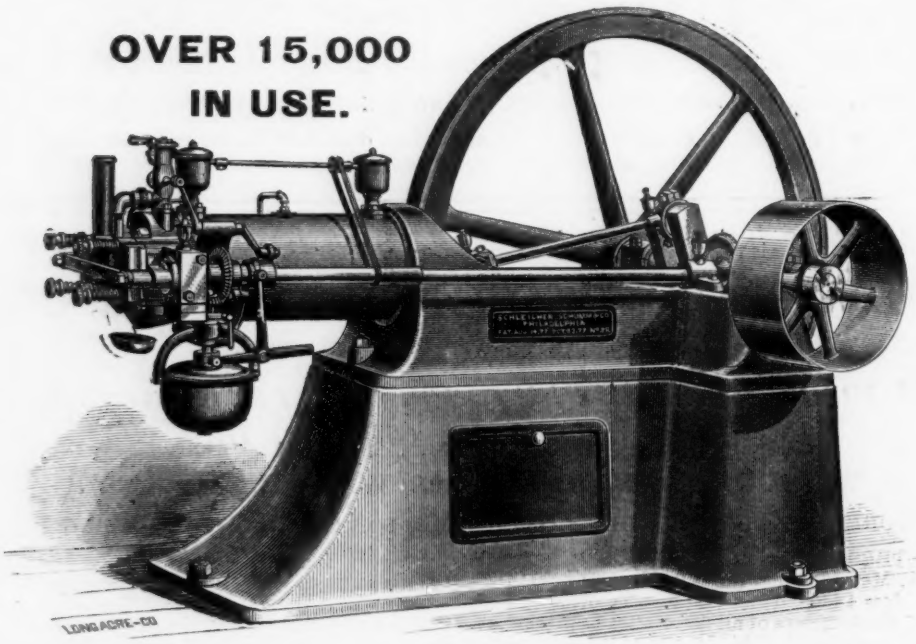

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